Arthritis

GENERAL PRINCIPLES,
PHYSICAL MEDICINE REHABILITATION

ARTHRITIS

General Principles, Physical Medicine, Rehabilitation

EDITED BY

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with Twenty four Collaborators

FOREWORD BY

Howard A Rusk, M D



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With deep affection and gratitude

TO MY PARENTS

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Foreword

With the dramatic and successful conquest of the major problems of acute disease, the problems of chronic disease have been placed in a new perspective. Although these problems are not limited to the aged, older persons are their particular targets. As the life span has increased, chronic disease has increased proportionately, and because further extension of the life span is inevitable, a still further increase in chronic disease is inevitable.

Unfortunately, the pathology of many of the chronic diseases remains irreversible. This does not mean, however, that the physical, emotional, social and vocational sequelae of these diseases must remain irreversible. Experience has shown that with modern dynamic rehabilitation much of the undesirable sequelae of these diseases can be minimized, alleviated or even eliminated.

This is particularly true for the arthritides, even though the medical-social-emotional-vocational conditions they present are among the most formidable of all chronic disease problems.

In this volume, for the first time, the problems of the patient with arthritis, rather than the problems of arthritis, are considered. The approaches suggested are based on research from the laboratories of clinical experience. They are approaches of interest not only to the physician but to all who are concerned with the total situation of the child, woman or man with the arthritides. This, therefore, is a book of value not only to physicians but to nurses, physical therapists, occupational therapists, social workers, psychologists, vocational and rehabilitation counselors, and the public and voluntary agencies concerned with the care and future of the sick and disabled arthritic.

Howard A. Rusk, M.D.

Introduction

Twenty years ago, arthritis was a dead disease Not only was it a chronic disease of unknown cause but treatment methods were so dismally ineffective that it commanded little attention or medical interest In the late 1930 s and 1940 s the injection of gold salts was first used in the therapy of rheumatoid arthritis and with the reports of moderately successful results there developed a flurry of renewed interest in the arthritic It remained, however for the introduction of cortisone and corticotropin in 1948 to spark a renaissance in the field of rheumatology With the enthusiasm that greeted the first results with steroids brilliant investigative minds in multiple basic and clinical fields of medicine were stimulated to undertake a great diversity of research in proportions never before seen in arthritis and with bountiful results Since 1948 each year has seen new progress and the fire of investigative enthusiasm has continued to burn brightly

Neither the cause of arthritis nor the cure is yet in sight and the problem remains a major and unsolved one But the armamentarium for treatment is today greatly reinforced and more effective Equally important there is acute awareness of the intricate ramifications of chronic disease which must be dealt with if the patient is to be benefited totally

The problem of chronic disease and of chronic arthritis specifically is one which has been magnified manyfold as the result of medical progress Less than twenty years ago more than 95 per cent of a physician s time was occupied in the care of patients with acute disease Hospital beds were filled with patients with scarlet fever meningitis dysentery malaria pneumonia venereal disease and other dangerous bacterial diseases In the mid thirties there began the disease revolution Sulfa drugs were the first weapon in what was to evolve into an almost completely victorious battle against infectious diseases In the forties came the discovery of penicillin followed by streptomycin aureomycin and the other mycins Today twenty years after the dawn of this era, the

physical and occupational therapists, vocational counselors, and others and use all available resources in working for a solution of all tangential problems consequent to the basic disease process. It is a sterile therapeutic triumph indeed to treat a basic disease process only to leave one's patient stranded within an institution or housebound to vegetate because of neglect of attention to peripheral facets of the disease.

Arthritis is a merciless disease, the worst forms of which strike in the prime of manhood or womanhood, having not the virulence to kill but only to cripple, disable, and wrack with pain. Most chronic diseases, on the other hand, in their progressive course ultimately culminate in death; hence, in long-term statistical estimations, these diseases, despite their rising incidences, will eventually, by virtue of their mortality rates, tend to level off in incidence. Arthritis, however, with its low mortality, may be expected in the years ahead to increase in incidence and to swell the ranks of those unfortunate enough to be afflicted and disabled by chronic disease. It is appropriate and timely, therefore, that this volume is devoted to the problems of the arthritic and is specifically intended to demonstrate the many resources, medical and other, which may be mobilized in a positive and dynamic attack on arthritis.

Much of the material in the book was originally presented in postgraduate seminars and lectures sponsored through grants from the Office of Vocational Rehabilitation of the United States Department of Health, Education and Welfare. Most of the photographs were taken by Mr. Stanley Simmons of the Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center. The art work was done by Miss Mary Lawrence of the Department of Anatomy and by Dr. Victor Ribera of the Department of Physical Medicine and Rehabilitation, New York University College of Medicine. To all of these persons thanks are extended.

Special gratitude is due Mrs. John Woodall and Miss Rose Elfinbein for their tireless and expert assistance in preparing the manuscript and the illustrations. Without their patience and help the volume could not have been assembled.

EDWARD W. LOWMAN

May, 1959

revolution is nearly complete and except for a few of the viral diseases the infectious diseases have been conquered Rarely today does a person die of diphtheria smallpox pneumonia tuberculosis dysentery or the other great epidemic killers of yesterday that snuffed the lives of infants, children adolescents and adults alike It is easier today to treat pneumonia than the common cold

In the wake of this conquest of infectious disease has come an increasing lengthening of man s life span Spared from fatal bacterial infections, man lives now to develop chronic diseases and the degenerative diseases of aging With the rapidly ascending incidence of such chronic diseases as arthritis heart disease cancer arteriosclerosis and others the death rate from chronic disease has increased 200 per cent in the past half century

Chronic disease presents some profound problems which do not generally occur with acute infectious disease If the patient with an acute disease recovers recovery is usually complete and he returns to his previous economic and social position having experienced only a temporary upheaval in his milieu The ramifications of chronic disease on the other hand are complex and widely diverse affecting spheres far from the purely physical Arthritis for example produces changes in nearly every area of life from employment to recreational activities The disease by inflicting physical disability may impose employment restrictions The latter in turn may precipitate economic reverses and financial dependence upon others or upon social agencies Economic stresses frequently lead to stresses within the home to frustrations and anxieties to strained interpersonal relationships and often to crystallization of disruptive forces within the family unit The total pattern of psycho socio-economic equanimity may thus become disturbed

The problem then of the person afflicted with chronic disease becomes a complex one to solve While its crux is the disease and its physical effects treatment to be productive must extend beyond the restricted sphere of the physical limitations imposed by the disease if the patient is to be restored to society functioning within the limits of his disability but to the full extent of his capabilities The total condition created by the disease must be treated for the social problem or the psychological one or the restriction placed on gainful employment may be as major a disabling obstacle to the patient s functioning in society as is the chronic disease per se In the care therefore of his patient with chronic disease the physician must assume the responsibility for the total care of his patient and should enlist the assistance of social workers psychologists

PART ONE

Arthritis General Features

1

The Problem and the Types

EDWARD W LOWMAN

Among all chronic diseases with the exception of mental illness rheumatic diseases take the greatest toll in morbidity Ten times more persons are disabled by rheumatism than by either tuberculosis or diabetes and seven times more than from cancer Statistically the extent of rheumatic disease in the United States is a rough calculation Probably the most familiar survey is that which was conducted by the United States Public Health Service in 1938 at that time it was estimated that nearly 7 000 000 persons were suffering from some type of rheumatic disease More recently in 1952 Woolsey of the United States Public Health Service reported results from a similar survey conducted among 25 000 households in 68 sample areas of 42 states His findings corroborated those of the earlier sampling On the basis of his sampling he estimated that in 1951 approximately 10 104 000 persons beyond the age of 14 years exclusive of persons with rheumatic fever and rheumatic heart disease were afflicted with rheumatism and that, of this group, 6 414,900 had had a diagnosis confirmed by a physician In addition, because of their arthritis approximately 2 500 000 had had to make some change in the type or amount of work they had been carrying on

Simply stated one out of every ten persons over the age of 14 is afflicted with some form of arthritis or rheumatism and more than 50 per cent of the instances of crippling involve persons under 45 years of age The socioeconomic significance of this situation is readily apparent With a disease of such magnitude possessing a low potential for killing and a high potential for disabling it is not surprising to find that it leads all other diseases in crippling and in economic loss In the United States alone more than 92 000 000 man days per year are lost because of rheumatism with an annual economic loss of a quarter billion dollars More workdays are lost as a result of arthritis each year than as a result of

TABLE I

NOMENCLATURE AND CLASSIFICATION OF THE ARTHRITIDES AND OTHER RHEUMATIC DISORDERS *

I Diseases and disorders commonly accepted as *rheumatic*

A ARTICULAR

Inflammatory
  Idiopathic
    Rheumatic fever
    Rheumatoid arthritis
    Atypical forms
      Psoriatic arthritis
      Still s disease
      Felty s syndrome
    Special forms
      Ankylosing spondylitis
      Intermittent hydrarthrosis
      Palindromic rheumatism
  Infectional
    Arthritis due to specific infection

Degenerative
  Osteoarthritis
  degenerative joint disease
  or osteoarthrosis

B NONARTICULAR

Bursitis
Fibrositis
Myositis myalgia
Neuritis neuropathy neuralgia
Panniculitis
Periarthritis
Tendinitis
Tenosynovitis

II Diseases and disorders with associated *rheumatic* features

Traumatic conditions
  Traumatic arthropathy
  Postural syndromes

Inflammatory idiopathic conditions
  Lupus disseminatus
  Periarteritis nodosa
  Dermatomyositis

Hypersensitivity states with musculo articular reactions to serums drugs

Cutaneous or mucosal manifestations or both
  Scleroderma
  Erythema multiforme
  Erythema nodosum
  Purpura (various types)
  Purpura rheumatica
  Reiter s syndrome
  Sjogren s syndrome

Metabolic disturbances
  Gout
  Ochronosis

Endocrine disturbances
  Hyperparathyroidism
  Acromegaly
  Myxedema and others
  Osteoporosis
    Menopausal senile others

Blood diseases
  Leukemia
  Hemophilia

Pulmonary diseases
  Sarcoidosis
  Hypertrophic pulmonary osteo arthropathy

Disease or disorder of the nervous system
  Neuropathic arthrosis

Psychiatric states and psychologic syndromes

Neoplastic diseases
  Neoplasms of articular or peri articular tissues

Osteochondrodystrophies

* Adapted from the schema proposed by the Committee on Nomenclature of La Ligue Internationale Contre le Rheumatisme

injuries sustained in accidents, and 12 per cent of all permanently and totally disabled persons in the United States receiving public assistance from the Federal Government suffer from arthritis or rheumatism. Further, it should be emphasized that arthritis is not restricted to old age; it may strike the infant as well as the aged, and the two most crippling forms, rheumatoid arthritis and rheumatoid spondylitis, characteristically afflict young persons in their third and fourth decades of life. The enormousness of the problem is thus obvious.

Arthritis by definition means inflammation of a joint. *Rheumatism*, on the other hand, originally was a term used to indicate a discharge of humors into any body cavity and was applied to such unrelated pathological entities as pleurisy, meningitis, peritonitis, etc. Gradually, as these entities assumed individual identification, *rheumatism* became more and more restricted in its scope of application. Today it is a term used *only to denote painful diseases of the musculoskeletal system*. Both *arthritis* and *rheumatism*, therefore, indicate symptom complexes the causes of which may vary widely. There are probably more than a hundred different causes for arthritis or rheumatism, the treatments and prognoses of which differ considerably. Before considering medical, surgical, physical medical, or rehabilitation treatment, it is basically important that an etiological as well as pathological diagnosis be established.

The classification and nomenclature of rheumatic diseases proposed by the International League Against Rheumatism (Table I) includes *many major categories of these diseases*. The majority of cases, however, fall within seven groups:

(1) Arthritis due to infection
(2) *Arthritis due to rheumatic fever*
(3) Rheumatoid arthritis (including rheumatoid spondylitis)
(4) Arthritis due to trauma
(5) Arthritis of gout
(6) Degenerative joint disease
(7) Nonarticular rheumatism

In order of frequency of occurrence, rheumatoid arthritis accounts for 30 to 40 per cent of cases, degenerative joint disease for 25 to 30 per cent, and nonarticular rheumatism for 10 to 20 per cent; these three groups alone comprise at least two thirds of all cases. Hence, although the potential causes of arthritis and rheumatism are formidable in number, the problem clinically, *from a treatment standpoint, is largely restricted to a small group of types*.

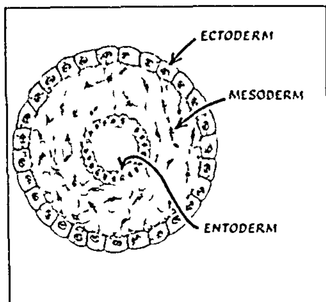


FIGURE 1 Diagram illustrating the three germinal layers

a jelly like ground substance which fills the space between the cells (Figure 2)

As will be seen this fundamental arrangement—cells embedded in a ground substance—is retained in all three varieties of the growing and mature supporting tissue

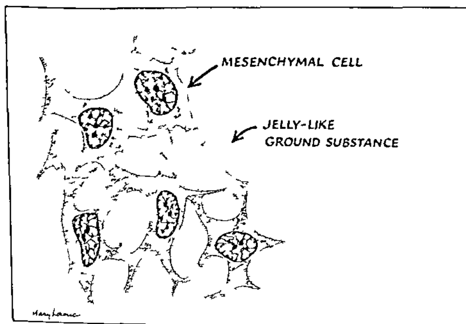


FIGURE 2 Mesenchyme (undifferentiated embryonic supporting tissue)

2

Some Aspects of the Anatomy of Joints

JOSEPH PICK

This account of the normal anatomy of joints is addressed to persons who are engaged in alleviating the discomfort of the patient afflicted with rheumatism or arthritis.

These conditions begin with subtle disturbances of the chemistry of the supporting tissues of the body. As a consequence there appear first delicate alterations of the microscopical components of these tissues. Later, as the disease progresses, the changes may result in conspicuous distortions and destructions, especially of those bones, cartilages, and ligaments which constitute the joints of the body.

MICROSCOPICAL ANATOMY OF SUPPORTING TISSUE

In the adult, supporting tissue occurs in three forms: connective tissue proper, cartilage, and bone. When fully grown, these types are clearly distinct, but they are akin in embryological origin, fundamental histological construction, and their ability to substitute for one another under pathological conditions.

Embryologically, all supporting tissue in higher vertebrates and in man is derived from the middle germinal layer, the mesoderm. This embryological supporting tissue, often called mesenchyme, is placed between the outer germinal layer, the ectoderm, which furnishes the lining of the outer surface of the body, and the inner germinal layer, the entoderm, which gives origin to the cells lining the inner surfaces of the body, such as the intestinal canal and the air passages (Figure 1).

Mesenchyme, the embryonic supporting tissue, consists microscopically of numerous cells with ramifying processes. These cells produce

least one glycoprotein has been identified, its consistency depends upon certain spreading factors—for example enzymes such as hyaluronidase—as well as upon certain hormones, such as the adrenocorticotropic hormone of the pituitary and cortisone of the adrenal cortex Connective tissue proper is supplied with blood vessels which penetrate the intercellular substance in a variable manner and serve the metabolism of cellular elements fibers, and amorphous substance

Cartilage

The cellular components of cartilage (Figure 4) the chondrocytes are roundish or flat in shape are found singly or stand together in groups of two or more, and are concerned primarily with the production of the intercellular substance

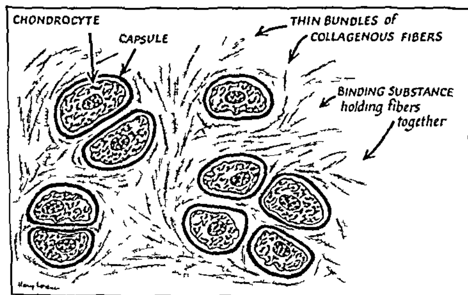


FIGURE 4 Cartilage

The intercellular substance of cartilage is composed of fibers and a binding substance which holds the fibers together The binding substance consists at least in part of chondromucoid a glycoprotein which contains a sulfonated polysaccharide—namely chondroitin sulfate

According to the type and arrangement of the fibers which form the intercellular substance cartilage can be classified as hyaline elastic or fibrous

Hyaline cartilage possesses a dense feltwork of thin collagenous fibers which are not distinct from the binding substance under ordinary micro-

Connective Tissue Proper

When developing in the direction of connective tissue proper (Figure 3) mesenchyme differentiates into cells of various form function, and potentialities such as the star-shaped fibroblasts which are credited with the production of intercellular fibers the macrophages (histiocytes) which combat inflammation by virtue of their mobility and capacity of phagocytosis lymphoid wandering mast eosinophil and plasma cells which are similar to or even identical with blood cells and finally un differentiated mesenchymal cells which according to needs can develop into any one of the mature types

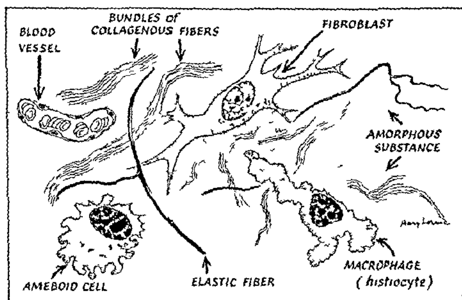


FIGURE 3 Connective tissue proper

The intercellular substance the derivative of fibroblasts represents the most conspicuous part of connective tissue it is made up of fibers and an amorphous matrix of liquid or gel like consistency The fibers occur in two varieties the white collagenous and the yellow elastic fibers According to mechanical stress connective tissue fibers are arranged in a variable manner For example when filling spaces between neighboring organs the fibers form thin bundles of loose texture while they are thick and stand densely together to withstand the great tension when forming tendons of muscles or ligaments of joints

The amorphous matrix plays an important role in connective tissue diseases its chemical composition is not fully understood although at

The ground substance of bone leaves spaces—the lacunae and canaliculi—for the cell bodies and processes of osteocytes As all lacunae communicate with one another through the canaliculi a network of spaces is formed which open at the surface of bone, near the blood vessels In this way the exchange of metabolites between the osteocytes and blood can take place

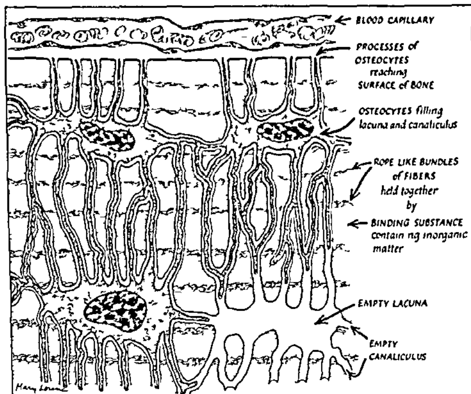


FIGURE 5 Bone

Bone receives its blood supply from two principal sources the nutrient and the periosteal blood vessels (Figure 6a) The nutrient artery and vein penetrate the thick compact layer comprising the periphery of the bone and enter the central or cancellous layers and bone marrow space The periosteal vessels which are contained in the membrane surrounding the bone supply only the most superficial layer of the compacta In the adult the branches of periosteal and nutrient vessels anastomose with one another The nutrient artery sends off fine branches the Haversian arteries into the compact layer Each Haversian artery is surrounded by concentrical layers of lamellae and osteocytes to form a Haversian system (Figure 6b) The most central layer of osteocytes is in direct contact with the Haversian vessels and can convey metabolites

scopical staining methods Hence the entire intercellular substance appears homogenous, it is glasslike or hyaline of light bluish color Hyaline cartilage is widespread in the embryo where it forms the temporary skeleton In the adult it is found as costal cartilage and on the surfaces of bones which form joints

Fibrocartilage is formed when the collagenous fibers are arranged as thick and conspicuous bundles which leave little space for the binding substance and squeeze the cellular elements together This variety occurs in the intervertebral discs articular cartilages or near the attachment of tendons or ligaments where it can often be mistaken for dense connective tissue

Elastic cartilage possesses elastic fibers and is found in the external ear and larynx of higher mammals and man

It is noteworthy that cartilage has no supply of blood vessels The ex*change of metabolites takes place by means of diffusion* through the ground substance Nevertheless cartilage is extremely sensitive to metabolic disturbances such as deficiencies in vitamin D calcium and phosphorus or to malfunctions of such hormones as the growth hormone of the pituitary

Bone

Bone (Figure 5) is often regarded as the most specialized variety of supporting tissue Bone not only furnishes the skeleton of the body it is also concerned directly with the metabolism especially of such minerals as calcium and phosphorus and it serves the formation of blood which takes place in the core of bones the bone marrow

The cellular elements of bone tissue the osteocytes are flat cells with numerous processes which extend in all directions The processes of *neighboring osteocytes connect with one another an arrangement which* is of utmost importance to the nutrition of bone cells

The intercellular or interstitial substance of bone also consists of collagenous fibers and a binding substance The fibers are arranged in bundles of a ropelike structure which appear as lamellae when treated with suitable staining methods The lamellae are held together by an amorphous binding substance similar to that of connective tissue proper *and cartilage However the binding substance of the bony matrix con*tains a high percentage of minerals—for example calcium phosphorus and fluoride The presence of minerals gives bone its hard consistency but it also prevents nutrient matter from seeping through the ground substance to nourish the cellular elements as is the case in cartilage

The ground substance of bone leaves spaces—the lacunae and canaliculi—for the cell bodies and processes of osteocytes As all lacunae communicate with one another *through the canaliculi a network of* spaces is formed which open at the surface of bone near the blood vessels In this way the exchange of metabolites between the osteocytes and blood can take place

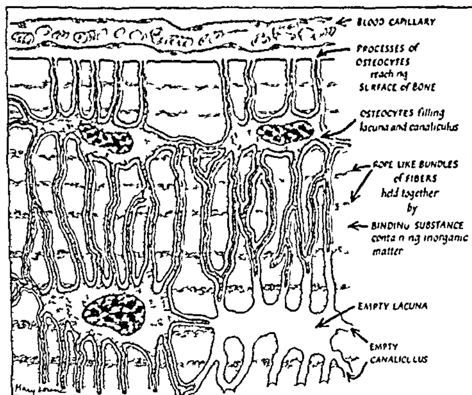


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to the more peripheral substances by way of their connecting protoplasmatic processes The paper thin trabeculae and spicules of cancellous bone are not arranged in Haversian systems but come in direct contact with the end ramifications of the nutrient vessels in the bone marrow space

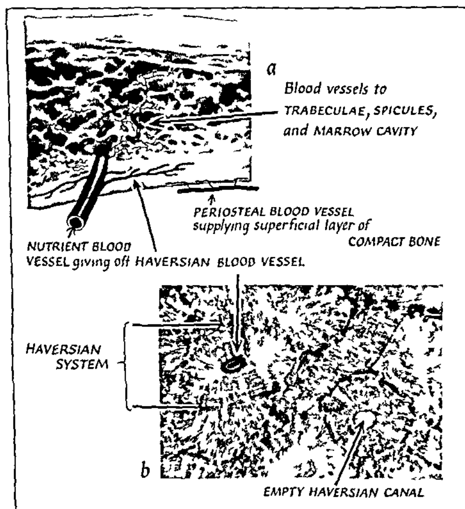


FIGURE 6 (a) Photograph of a section through the clavicle Note the distribution of the two sources of blood supply the periosteal vessels nourish the peripheral layer of the compact bone the branches of the nutrient artery the central layers and the bone marrow (b) Photomicrograph of a ground section through compact bone Note the artery in the Haversian canal

As regards the histogenesis of the three varieties connective tissue proper and cartilage always develop directly from mesenchyme Bone on the other hand can be formed in two ways either directly from embryonic supporting tissue or indirectly by replacing the cartilaginous

skeleton Both types participate in the formation of adult bones, although some are chiefly derived from membranes while others are, in the main, the result of substitution of cartilage by osseous tissue The long bones of the limbs for example develop from their cartilaginous molds as follows (Figure 7) First the shaft is invaded by an artery Presently cartilage is dissolved in the middle of the shaft and an ossification center appears which forms the bony diaphysis together with an osseous ring derived from the periosteum A little later the ends of a fetal humerus

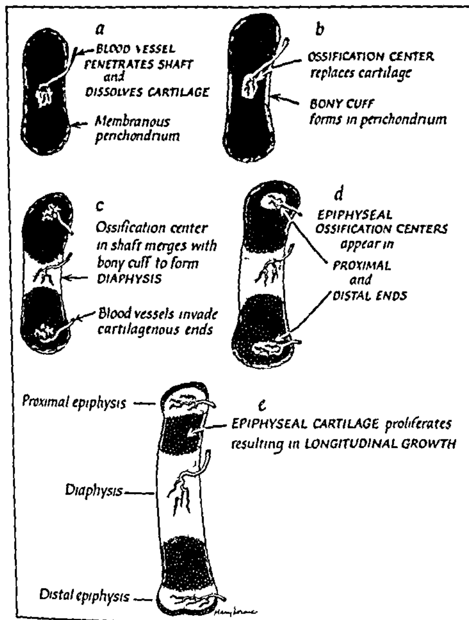


FIGURE 7 The principle of bone development

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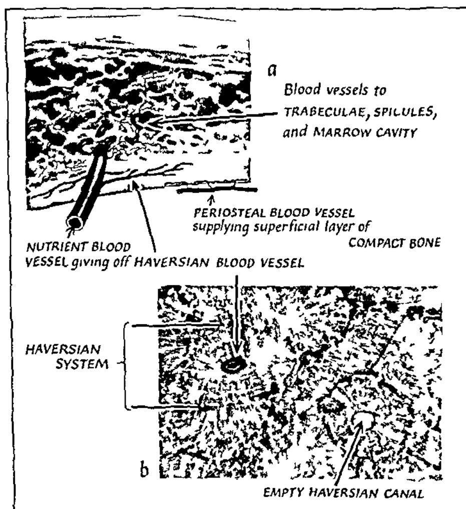


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skeleton Both types participate in the formation of adult bones, although some are chiefly derived from membranes while others are, in the main the result of substitution of cartilage by osseous tissue The long bones of the limbs for example develop from their cartilaginous molds as follows (Figure 7) First the shaft is invaded by an artery Presently cartilage is dissolved in the middle of the shaft and an ossification center appears which forms the bony diaphysis together with an osseous ring derived from the periosteum A little later the ends of a fetal humerus

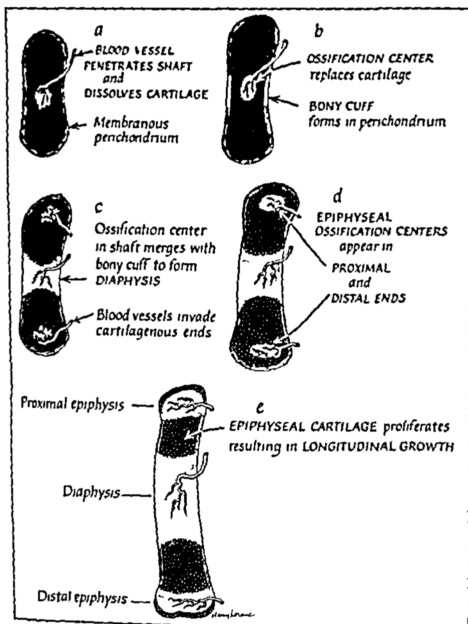


FIGURE 7 The principle of bone development

to the more peripheral substances by way of their connecting protoplasmatic processes The paper thin trabeculae and spicules of cancellous bone are not arranged in Haversian systems, but come in direct contact with the end ramifications of the nutrient vessels in the bone marrow space

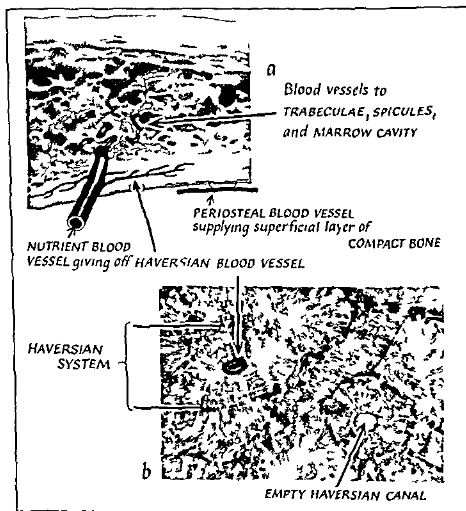


FIGURE 6 (*a*) Photograph of a section through the clavicle Note the distribution of the two sources of blood supply the periosteal vessels nourish the peripheral layer of the compact bone the branches of the nutrient artery the central layers and the bone marrow (*b*) Photomicrograph of a ground section through compact bone Note the artery in the Haversian canal

As regards the histogenesis of the three varieties connective tissue proper and cartilage always develop directly from mesenchyme Bone on the other hand can be formed in two ways either directly from embryonic supporting tissue or indirectly by replacing the cartilaginous

ends of the neighboring cartilages (Figure 8a) This layer of dense connective tissue is continuous with the perichondrium, the membrane which covers the surface of the cartilaginous skeleton Presently, the dense tissue between the cartilages becomes partly loose and at spots, even resorbed to form a small cleft and is partly incorporated in the formation of the cartilage (Figure 8b) The small clefts fuse to a single or double space which extends around the articulating ends of the cartilages as far as to the perichondrium and to an external layer which gives origin to the fibrous capsule of the joint Later the inner surface of this fibrous capsule attains a loose texture with a rich blood supply and becomes the synovial capsule, which carries a lining of cells The latter produce the synovial fluid in the joint space (Figure 8c)

The development of certain joints is terminated with the formation of an intervening tissue without the appearance of a joint space This is the embryological explanation for the existence of bone connections with and without joint space

GROSS ANATOMY OF JOINTS

Functionally the locomotive system of the body is a unit but anatomically it is comprised of several components It consists of bones which are connected with one another by means of joints and which can be moved by muscles upon nervous stimulation Bones membranes, joints, muscles and their tendons are endowed with sensory nerve receptors which inform the central nervous system on the state of contraction of muscles and on the position of bones tendons and membranes in the body and which also transmit the sensation of pain from these structures Almost all parts of the locomotive system are richly supplied with blood vessels which are controlled by vascular branches of the autonomic nervous system

The close interrelationship of the components of the locomotive system is also apparent under pathological conditions A fracture of a bone for instance is almost always associated with hemorrhage and muscle spasm which in turn immobilizes the neighboring joints and causes pain Or pain originating from diseased joints produces muscle cramps and vasoconstriction which in turn aggravates the pain and causes further impairment of function

It is therefore well to remember the interdependence of these structures when attempting to remedy pathological conditions of joints by physical therapy

or femur also are invaded by blood vessels which form the proximal and distal bony epiphyses The diaphysis and the epiphyses grow towards one another leaving between them the epiphyseal cartilage While the general replacement of cartilage by bone is taking place the epiphyseal cartilage keeps on proliferating during infancy and adolescence and is thus responsible for the longitudinal growth of such a bone Toward the end of puberty the epiphyseal cartilage is also replaced by bone a time which marks the termination of longitudinal growth of an individual

The differentiation of mesenchyme in various types depends upon genetic factors as well as upon the proper interplay of the endocrines such as the pituitary gonads thyroid and parathyroid glands

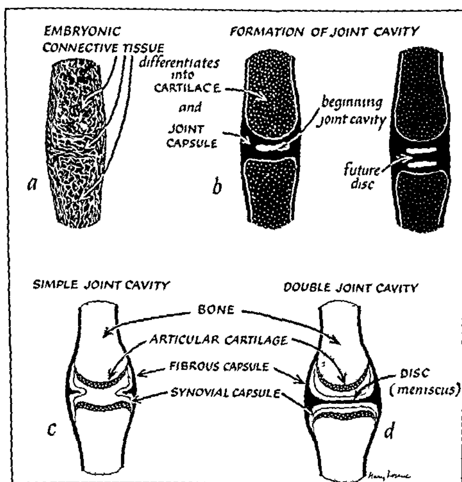


FIGURE 8 The principle of joint formation

The principles of the embryology of joints are of special interest here (Figure 8) A joint in the cartilaginous skeleton of the limbs for example begins with the appearance of dense connective tissue which unites the

The classification of joints as synarthroses and diarthroses is not always distinct—as in considering for example the symphysis pubis where the intervening cartilage is not solid as in other synchondroses but can contain smaller or larger clefts

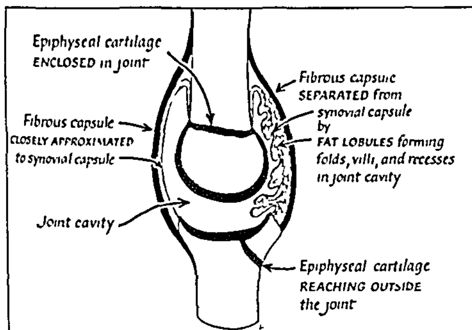


FIGURE 10 Diarthrosis (true synovial joint)

Diarthrodial or True Synovial Joints

Discontinuous bone connections deserve a more precise description here because they play a more significant role in arthritis True synovial joints are not only more frequently affected by pathological changes on account of their anatomical peculiarities but such changes are also more significant clinically because they diminish the mobility of joints and are *therefore the cause of impaired function or even severe crippling*

The Articular Surfaces The articular surfaces are of variable shape in different joints they form a ball and socket as seen in the shoulder or hip joints or they may be shaped like a saddle or a trochlea or they may even be flat The shape of the articular surfaces is determined by phylogenetic and ontogenetic factors The usage of a joint also molds the form of the articular surfaces The *dependency of the form of a joint upon* muscular traction is particularly apparent under pathological conditions, where the shape of the articular surfaces may become severely distorted It is also interesting to note that the concave articular surface is always

Definition and Classification of Joints

A joint is formed by the union of two or several bones Some joints are permanent, because they persist throughout life while others, such as the connections between the flat bones of the skull cap or between the shaft and the ends of long bones are temporary because they disappear during postnatal growth

According to their anatomical properties bone connections either form continuous joints synarthroses or discontinuous joints diarthroses

A synarthrosis (Figure 9) is a joint in which the bones are connected

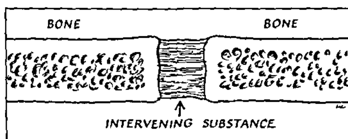


FIGURE 9 Synarthrosis

by an intervening substance The connecting substance itself may consist of any of the three varieties of supporting tissue

Accordingly synarthrodial joints can be subclassified as syndesmoses when the intervening substance consists of connective tissue proper such as the interosseous membrane between the radius and the ulna as synchondroses when bones are held together by cartilage such as epiphyseal cartilage between the shaft and the head of the humerus, and as synostoses (schindylesis) when the connection is accomplished by bone as seen for example in the articulations of some bones of the skull

There is no or little mobility in synarthrodial joints because the intervening substance usually fastens the bones tightly together

A diarthrosis (diarthrodial or true synovial joint) (Figure 10) is a joint in which the articulating surfaces are covered by cartilage but remain permanently separated by a space the joint cavity A membrane the joint capsule extends between the bones and surrounds their articulating surfaces and the joint cavity The joint capsule is made up of a strong outer layer the fibrous capsule and an inner thin membrane the synovial capsule which produces a mucus like fluid the synovial fluid in the joint cavity

recesses (Figure 10) The presence of such projections of the synovial membrane facilitates the formation of adhesions and renders the removal of pathological fluid difficult

The synovial capsule is a thin connective tissue membrane which is lined by a layer of endothelial cells that produce the synovial fluid, and which surrounds completely the joint cavity The synovial membrane is attached at the border of articular cartilage and bone, as will be seen in Figure 10 it travels directly from this line of the socket to the convexity where it covers first the bare bone before inserting into the bony cartilaginous junction Another point of interest is the relation of the epiphysis to the insertion of the synovial membrane In some instances the epiphysis is entirely within the joint, while it may partially or even completely be located outside the joint space in others (Figures 9, 10) The synovial membrane may form an outpocket projecting through the fibrous capsule to form a mucous bursa to diminish the friction of a muscle or tendon which runs across the joint

The fibrous capsule is far stronger and consists of collagenous and some elastic connective tissue The thickness of the fibrous layer of one and the same joint is not always the same In some places the fibrous capsule is extremely thin but in others it is particularly thick and strong to form ligaments and strengthen the joint which is the principal function of this structure Indeed certain ligaments are strong enough to sustain a weight of well over 100 pounds without tearing

However the bones of joints are not only held together by the fibrous capsule Factors such as adhesion of one articular cartilage to its fellow of the opposite side the atmospheric pressure (the joint cavity is a closed space), and above all the traction of the muscles which cross over the joint help to maintain the contact of the articulating bones

Mechanics of Joints As mentioned above, the mobility of joints is determined primarily by the shape of their articular surfaces, but the range of motion is limited by ligaments and muscular traction Accordingly there are hinge joints such as the finger joints, which permit motion only in one plane—for example, flexion and extension or there are pivot joints which allow only rotation Joints with greater mobility are the wrist and the carpometacarpal joints of the thumb, which can be moved around two principal axes The highest degree of mobility is attained in ball and socket joints Thus in the shoulder and hip joints it is possible to perform forward and backward flexion sideward movement and approximation of the limbs to the body (abduction and adduction) and rotation around the central axis of the humerus and femur

near the origin of the muscles which move the joint while the convexity is conspicuously distant from the insertion of these muscles

The cartilage which covers the bony articular surfaces provides a certain elasticity and smoothness although the cartilaginous surfaces which face each other in a joint are by no means completely congruent The cartilages of the articular surfaces are of the hyaline type in most joints, but consist of fibrocartilage in others Fibrocartilage helps to deepen the concavity of such articulations as the shoulder or hip joint, by forming a rim the glenoidal labrum which is attached to the margin *of the glenoidal fossa of the scapula and acetabulum respectively*

Obviously, the shape of the articular surfaces determines the mobility of a joint to a large extent as will be pointed out later

The Joint Cavity The joint cavity is normally a capillary space which is bounded by the articular surfaces and the synovial membrane of the joint capsule The joint cavity contains a small amount of synovial fluid which is produced by the synovial membrane and lubricates the joint This fluid is a colorless or slightly yellowish viscid substance which contains normally between 200 and 1000 cells, mostly of the mononuclear type, per cubic millimeter The liquid phase of the synovial fluid is called mucin which is chemically similar to hyaluronic acid The viscosity of the synovial fluid on the other hand most likely depends on the presence of the enzyme hyaluronidase

Under pathological conditions the joint cavity can be distended by such fluids as serum, blood pus or by substances injected into the joint Although there are no accurate data as to the normal amount of synovial fluid in individual joints the normal content is obviously dependent upon the size and the tightness of the capsule of the joints

The joint cavity is not always a simple space, because it can more or less be subdivided by a plate of cartilage an articular disc or meniscus Thus the joint cavity of both the sternoclavicular and the mandibular joint is separated completely in two halves while in the knee joint for example a C shaped semilunar disc divides the joint space only incompletely In addition the joint cavity may be traversed by the tendons of neighboring muscles Thus the bicipital tendon passes freely through the shoulder joint and the popliteal muscle through the knee joint

The Joint Capsule The inner synovial and the outer fibrous layer of the joint capsule are closely approximate in some joints In others, the two layers are separated by small fat pads of variable size These fatty lobules of irregular shape may project the synovial membrane into the joint cavity in the form of folds or villi and thereby produce spaces and

3

Pathology of Arthritis

CURRIER McEWEN

In this discussion of the pathological changes which occur in rheumatic diseases consideration is limited to those types of arthritis which most commonly present physical rehabilitation problems

The gross and microscopic anatomy of normal joints is described in Chapter 2 Pathology which is the study of abnormal structures is also divided into gross changes which can be seen with the unaided eye and microscopic changes which require the aid of the microscope Lesions can occur in bone cartilage synovial membrane and joint capsule and in the surrounding soft tissues The primary damage can be intra articular or periarticular Diseases which cause lesions inside the joint and in the joint capsule are referred to as arthritis Those with lesions only outside the joints comprise the group of disorders called nonarticular rheumatism

Disability may result either from inflammation from scarring or from other mechanical damage In an active stage of arthritis the patient may hold his joints stiff because there is such inflammation in and around them that movement is painful These same joints may remain stiff years after the disease is over if the inflammation has resulted in scarring or permanent damage to essential structures Damage to the articular cartilage is especially serious Indeed one may say almost axiomatically that so far as intra articular damage is concerned the end result in terms of functional capacity depends on the amount of injury sustained by the cartilage The reason for this is that in contradistinction to practically every other tissue in the body the articular cartilage has almost no capacity to regenerate once it is injured Consequently the damage is permanent This damage in itself causes disability but in addition the daily wear and tear in such a joint is far greater than normal this leads to still further disability as years pass

The diseases that are included under the general heading of arthritis

respectively without displacement from this axis Each of these movements can be carried to an extreme In circumduction a conical space is described whereby the extremity is moved say from extreme forward (ventral) flexion to abduction backward (dorsal) flexion adduction and again to forward flexion On the whole the range of any of these motions is typical although it is subject to a great deal of individual variations

Blood Supply of Joints Except for cartilage all other components of joints—for example bone and capsule—are richly supplied with blood vessels Several major arteries approach the joint capsule and then break up in smaller branches to communicate with one another by means of an arterial network which feeds both the fibrous and synovial capsules The ends of the articulating bones at least in the adult are fed by the nutrient blood vessels Blood is drained from the joints by corresponding veins which are also accompanied by lymph vessels

Nerve Supply of Joints Joints are supplied by sympathetic motor nerve fibers and by afferent nerves Sympathetic fibers regulate the blood flow primarily by inducing vasoconstriction of the small arterioles

Afferent fibers conduct at least two different modalities to the brain One type arise from joint membranes by means of the nerve endings of Ruffini and carry along large myelinated fibers the sensation of the position of these membranes to the central nervous system These fibers keep the brain informed as to whether a joint is bent or extended, and are therefore indispensable for maintaining normal posture and locomotion of the body

The other type of afferent fibers begin with free endings and are comprised of small fibers which transmit the feeling of pain

All nerve fibers form a large network in the capsule of the joint and periosteum of the bone before they are arranged into distinct nerve bundles and join the major nerves which pass over a joint. Accurate knowledge of the anatomy of the major nerve stems which provide articular branches is particularly important whenever chemical nerve block is attempted for the relief of pain originating in a specific joint.

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Disability may result either from inflammation, from scarring, or from other mechanical damage. In an active stage of arthritis the patient may hold his joints stiff because there is such inflammation in and around them that movement is painful. These same joints may remain stiff years after the disease is over if the inflammation has resulted in scarring or permanent damage to essential structures. Damage to the articular cartilage is especially serious. Indeed, one may say almost axiomatically that so far as intra-articular damage is concerned the end result in terms of functional capacity depends on the amount of injury sustained by the cartilage. The reason for this is that, in contradistinction to practically every other tissue in the body, the articular cartilage has almost no capacity to regenerate once it is injured. Consequently, the damage is permanent. This damage in itself causes disability, but in addition the daily wear and tear in such a joint is far greater than normal; this leads to still further disability as years pass.

The diseases that are included under the general heading of arthritis

and rheumatism are also frequently referred to as rheumatic diseases For many of them the terms collagen diseases' and 'connective tissue diseases are also frequently used because the primary site of damage appears to be in connective tissue (see Chapter 2)

Least is known about the ground substance of connective tissue yet it is probably the most important part, for it is thought to be the site at which most of the pathological changes of the rheumatic diseases have their start

Probably the initial phase of inflammation in connective tissue in such a disease as rheumatic fever or rheumatoid arthritis is a physical-chemical alteration in the ground substance which cannot be seen even with the most powerful light microscope Very soon visible changes appear consisting of an increase in the amount of intercellular fluid which pushes the cells and fibrils apart (so-called inflammatory edema), and the appearance of polymorphonuclear leukocytes Within a few hours a proliferation of the local connective tissue cells begins Gradually new capillaries engorged with blood appear and the proliferated connective tissue cells (histiocytes) become the predominant cell type This kind of lesion is called a granuloma Eventually collagen fibers are formed and healing takes place through scar formation Some areas of healing occur continuously in most cases but simultaneously new lesions are being formed with the result that active inflammation usually goes on for years

With this general introduction one may now consider the pathological changes which occur in such individual diseases as rheumatic fever rheumatoid arthritis psoriatic arthropathy spondylitis osteoarthritis (or degenerative joint disease as it is better called), gout nonarticular rheumatism and ome of the rarer diseases *

RHEUMATIC FEVER

The characteristic feature of rheumatic fever, so far as the joints are concerned is that it does not produce permanent damage The great damage caused by rheumatic fever is to the heart, and whereas much often needs to be done to help in the rehabilitation of patients with rheumatic heart disease the joints clear up promptly and completely under the influence of salicylates corticosteroids or other antirheumatic agents and physical rehabilitation is not required

* The pathology slides included in this chapter are from the Pathology Teaching Collection of the Arthritis and Rheumatism Foundation and are used by courtesy of the Foundation.

Figure 11B illustrates the synovial inflammation in rheumatic fever, there is swelling of the tissues due to inflammatory edema and infiltration by leukocytes The disease however does not affect the cartilage and therefore permanent disability does not result Patients can have many attacks of acute rheumatic polyarthritis with no residual impairment of articular function in spite of the fact that during each acute attack the involved joints were completely immobilized by inflammation and pain

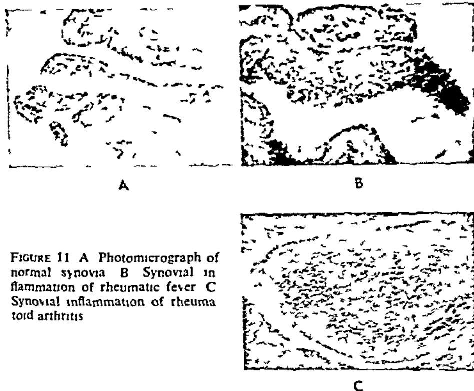


FIGURE 11 A Photomicrograph of normal synovia B Synovial inflammation of rheumatic fever C Synovial inflammation of rheumatoid arthritis

In the case of the heart on the other hand for reasons not understood the inflammation of rheumatic fever causes lesions which result in permanent injury to the valves heart muscles and pericardium and go on to the stage of scarring The valve leaflets become thickened and shortened so that they resist the flow of blood trying to pass through in the normal direction (valvular stenosis) and no longer close the valvular orifice completely permitting the blood to flow back through it in the wrong direction (valvular insufficiency) It has been aptly said that rheumatic fever is a disease which bites the heart but merely licks the joints

RHEUMATOID ARTHRITIS

In rheumatoid arthritis the situation is entirely different because the heart usually is spared and it is the joints which sustain progressive and permanent damage

The earliest lesion one can observe in rheumatoid arthritis is inflammation of the synovial membrane Probably it starts as an initial chemical change in the ground substance as discussed above but this cannot be seen with existing microscopes and is in the realm of speculation With the microscope, one sees in the early cases a thickening of the membrane due to edema and an increase in the number of leukocytes (see Figure 11C) *As a result of the inflammation there is also an increase in the* amount of synovial fluid comparable to the accumulation of fluid in other enclosed spaces like the pleural pericardial or peritoneal cavities when their lining membranes become inflamed Inflammatory changes may be present also in the capsule of the joint and in the periarticular soft tissues



Figure 12 Pannus formation which almost fills the joint space



Figure 13 Granulation tissue of pannus eroding articular cartilage

The inflammation manifests itself in swelling local heat tenderness pain made worse by movement and sometimes by local redness about the joint The inflammation usually is much less acute than that in rheumatic fever It differs also from that of rheumatic fever in that instead of disappearing after a few days it gradually becomes chronic and the synovial membrane takes on the characteristics of a granuloma or granulation tissue This type of tissue reaction is seen in various forms in many chronic inflammatory diseases As already noted it is charac-

terized by proliferation of the fibroblasts and other connective tissue cells and by the appearance of newly formed capillaries Gradually the hypertrophied granulomatous synovial membrane tends to fill the entire cavity of the joint

A very serious characteristic of the granulation tissue is that it tends to grow over the surface of the cartilage in a thin sheet called a pannus (Figure 12) Sometimes it also works its way behind the articular cartilage probably due to digestion by enzymes made by the granuloma cells (Figure 13) Gradually therefore the cartilage loses its smooth shining surface and becomes pitted and furrowed Even if the disease ends at this stage it is inevitable that some permanent disability will remain because the cartilage has been injured The destruction of cartilage often progresses still further until there may be nothing but small islands of cartilage left in a mass of granulation tissue The subchondral plate of bone beneath the articular cartilage may also be eroded Finally after many months, the granulation tissue may be gradually transformed into dense scar tissue extending across the joint from bone to bone, causing so-called fibrous ankylosis (Figure 14A) Eventually this may become transformed into bone causing ankylosis (Figure 14B)

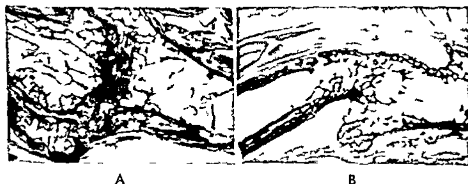


FIGURE 14 A Joint space obliterated by fibrous tissue B Complete loss of joint with bony ankylosis

Various subluxations or even complete dislocations are also common occurrences The joint is made quite unstable through the destruction of cartilaginous and bony articulating surfaces and the constant pull of the muscles tends to make the ends of the bone slip out of alignment and become subluxated Figure 15 is an x ray of the hand of a patient with advanced rheumatoid arthritis showing subluxations of the phalanges Even if subluxations do not occur the powerful flexor muscles tend to pull the joints into a partly flexed position This is often abetted by the

patient s desire to hold the joints partially flexed because they are some what relaxed and less painful in that position In the case of knee involvement for example the patient likes to lie with a pillow behind the knees thus encouraging the development of flexion contractures



FIGURE 15 Far advanced rheumatoid arthritis

PSORIATIC ARTHROPATHY

Some patients with the skin disease called psoriasis develop a form of joint disease which is thought by many to be merely a variant of rheumatoid arthritis but which others consider an entirely distinct disease Characteristically there is involvement of the distal interphalangeal joints of fingers and toes having psoriatic changes of the nails However many other joints may be involved and the distal interphalangeals not infrequently escape Typical changes in distal interphalangeal joints as seen roentgenologically are shown in Figure 16



FIGURE 16 Psoriatic arthropathy

SPONDYLITIS

The word *spondylitis* means merely inflammation of the spine usually however it is used to refer to the particular type called Marie-Strumpell spondylitis or ankylosing spondylitis

As with rheumatoid arthritis which affects the joints of extremities this disease is characterized by inflammation of the synovial lining of joints particularly the facet joints so that a major characteristic of early spondylitis is synovitis This pathologic change usually begins

in the low back, the sacroiliac joints become involved first with sacroiliitis accounting for the first symptom (Figure 17) The inflammation of spinal joints goes through an evolution similar to that described for the classical rheumatoid arthritis involving joints of the extremities As the synovitis progresses it interferes with nutrition of the cartilage, so that the cartilage becomes damaged This usually results in disintegration thinning and roughness of the surface of the articular cartilages



FIGURE 17 Sacroiliac and facet joint changes in early spondylitis

Fibrous tissue proliferates into the inflammatory area producing fibrous ankylosis If this exists for long it may become calcified with resultant bony ankylosis The latter causes stiffness of the spine just as it causes immobility of peripheral joints when the disease progresses to this final stage

In addition to this cause for stiffness an unusual pathologic characteristic of ankylosing spondylitis not found in other forms of arthritis is the tendency to the development of subligamentous calcification Along the outside of vertebrae and intervertebral cartilages calcium is deposited so that the spine becomes encased in a calcium shell Until recently it was thought that this calcium was deposited in the ligament and it was commonly referred to as ligamentous calcification The calcium however actually is not deposited in the ligament but between the ligament and bone Although radiologists usually report calcified ligaments ' the ligament at autopsy can be stripped off and is relatively

healthy even though a shell of calcium lies underneath it along the exterior portion of the vertebral bodies and intervertebral discs

Spinous calcification is an irreversible pathologic change and there is no known way to cause this calcium deposit to absorb and to restore free motion to the spine The lower thoracic and upper lumbar portions of the spine are the first to show abnormal calcification This is patchy with areas between that are not calcified (Figure 18A) As the disease pro



FIGURE 18 A Spinous calcification with patches of areas not calcified B Bamboo spine

gresses to a late stage calcific deposits may combine so that the entire spine becomes one continuous structure often called a bamboo spine

because it looks like a bamboo pole in a roentgenogram (Figure 18B) Fixation thus may result from either intra articular ankylosis or perispinous calcification or a combination of both

OSTEOARTHRITIS

Osteoarthritis is also called degenerative joint disease and as the name implies is a degenerative process rather than an infectious or primarily an inflammatory one In contrast to rheumatoid arthritis in which the earliest lesions apparently begin in the synovial membrane the initial lesion in osteoarthritis probably is an atrophy of the articular cartilage

Figure 19 is a schematic drawing of a cross section of articular cartilage illustrating various features (see also Figure 4, Chapter 2) These include

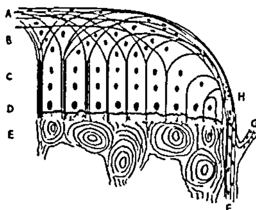


FIGURE 19 Diagram of structure of articular cartilage

the Haversian canal in the bone (E) the subchondral plate of bone lying immediately beneath the cartilage (D) the articular cartilage (CBA) and the periosteum (F) The drawing shows the way in which the fibers of the cartilage bind the latter together and rising through it become the perichondrium (H) the tough outer layer of cartilage, which in turn merges with the periosteum lining the bone One can readily see how magnificently designed this arrangement is to hold the articular cartilage solidly in place The illustration shows also the way in which the cartilage cells become smaller and tend to flatten out as one examines them progressively from the deepest layers (D and C) where they are formed to the most superficial layer (A)

Cartilage has many good and bad characteristics In its position between bone it takes maximum wear and tear It has many features making it ideal for this function It looks and acts like rubber It has no

sensitivity or nerve supply which is an advantage in many respects, but a disadvantage in that the body does not have the danger signal of pain to guide it as to the degree of use being applied to a joint Besides having no nerve supply it also has no blood supply In the articular cartilage the only way the cells receive nourishment is indirectly from the blood vessels in the bone (the Haversian canals) from below and from the synovial fluid that bathes the cartilage inside the joint Obviously, this is an inefficient means of obtaining nourishment, and therefore articular cartilage is at a disadvantage in this regard compared with tissues which possess their own networks of blood vessels Also cartilage has almost no power to repair itself Once damaged or lost, it is apt to be replaced mainly by fibrous or scar tissue

It is probably these features that are responsible for the fact that articular cartilage is one of the early tissues to show degenerative changes with advancing age (Figure 20)

This degeneration can be shown as fibrillation of the cartilage even at the early age of 10 years The fibrillation increases gradually and by old age there may be large areas of bone completely denuded of cartilage



FIGURE 20 Early fibrillation of articular cartilage

FIGURE 21 Marked loss of cartilage and osteophyte formation laterally in an osteoarthritic joint

In Figure 21 there is shown a photomicrograph of articular cartilage from a joint exhibiting fairly advanced osteoarthritis Its similarity to the structures shown diagrammatically in Figure 19 is obvious One sees apparently healthy bone and subchondral plate but the normally smooth glassy surface of the articular cartilage is furrowed and uneven

Figure 22 shows surfaces of knee joints of people of different ages In contrast to the relatively normal surface of the joint of a young person (left upper picture) the articular surfaces of cartilage of two elderly patients are shown in the lower two joints The cartilage is thinned out

and fissured and in some places is worn right down to the subchondral bony plate

Once the bone no longer is receiving adequate protection from the cartilage it reacts by the laying down of more and denser bone at the areas that are beginning to be denuded of cartilage At the joint margins this sclerosis exhibits itself as spurs which stick out beyond the joint surface probably following the lines of least resistance there The sclerosis is molded to the contours of the joint where it is being pressed on by an adjacent bone



FIGURE 22 Osteoarthritic changes in knees

Sooner or later certain areas of sclerosis lose their blood supply and this results in absorption of bone in small areas giving the appearance of cysts in the subchondral bone The pathology mentioned above results in a characteristic x ray appearance (Figure 23) As a result of the loss of cartilage the interarticular space becomes decreased Cartilage is translucent to x ray, and therefore cannot be visualized by this means, but the decrease in interarticular space can usually be seen as can the sclerosis of the joint surface and the spur formations at the joint margins



FIGURE 23 Marked osteoarthritic changes in (A) knees and (B) lumbar spine

GOUT

Although it is clearly established that gout is associated with a disturbance of uric acid metabolism its full mechanism is not understood

In the early stages of gout the attacks occur acutely They are like rheumatic fever in the sense that they cause no damage to cartilage and that patients have no symptoms between attacks As times goes on the urates accumulate in the body and settle out in the form of tophi Figure 24 is a photograph of the foot of a patient with advanced gout One toe is severely damaged by tophaceous deposits of urates which are visible



FIGURE 24 Gouty tophi in a foot

through the skin In Figure 25 is shown an x ray of the same foot One can see the shadow of tophi in the soft tissues as well as destruction of bone where a tophus has eroded through it Once cartilaginous damage has been done by tophi gout has entered its chronic stage Acute attacks occur as before but now there is some degree of continuous disability between attacks and this becomes progressively worse over the years as the damage to cartilage and bone advances



FIGURE 25 Bone destruction the result of gout

NONARTICULAR RHEUMATISM

Included under this heading are a variety of rather ill-defined symptom complexes such as bursitis tendinitis myositis fibrositis, the shoulder-hand syndrome and others Although they are very common little is known about the pathological changes underlying them In the case of bursitis calcium deposits often are demonstrable radiologically in the bursae and in the tendons which lie under them but it is not clear to what extent these deposits are the cause of symptoms Certainly inflammatory changes must be present in the various painful and tender tissues, but this is an area of pathology which has been all too little explored One point on which there is little doubt is the tendency for the shoulder arm and hand of patients with severe periarticular inflammation at the

shoulder to become stiff and atrophic, the so called frozen shoulder, if put at rest very long

COLLAGEN DISEASES

An account of the pathology of rheumatic diseases would be incomplete if it did not include a statement on the so called 'collagen diseases These include, besides rheumatic fever and rheumatoid arthritis, which have already been discussed, systemic lupus erythematosus, poly arteritis (periarteritis) nodosa dermatomyositis scleroderma and perhaps several other diseases Because there is a voluminous literature on tissue lesions in these diseases, a full consideration would be out of place in this volume

4

Clinical Features and General Medical Treatment*

EMMANUEL RUDD RICHARD H FREYBERG,
EDWARD F HARTUNG, and EDWARD W LOWMAN

RHEUMATOID ARTHRITIS

Rheumatoid arthritis is a disease of unknown cause its course is unpredictable and there is no known specific treatment It is therefore not surprising that a patient afflicted with this illness is fearful and confused He gets misinformation from friends and relatives reads popular medical articles and shifts from one doctor to another in his search for quick relief and for cure To guide him properly out of the maze of false notions all those who participate in the treatment of rheumatoid arthritis—physicians therapists nurses etc —should be well acquainted with the clinical manifestations and the best current treatment for this disease

It is the current opinion that this disease is more prevalent in women and more common in young adults Actually the female predominance is not striking and the age prevalence is not as remarkable as it was once thought to be Several recent studies stress the frequency of rheumatoid arthritis in individuals past fifty and a good number of cases occur in the late decades of life

Clinical Features

The onset of the disease is usually insidious and for months the patient may complain only of fatigue It will be more difficult for her to cope with the house chores and she will be particularly tired in the morning It should be emphasized here that rheumatoid arthritis is a systemic

* No attempt is made here to discuss all types of arthritides Only those which pose the most common physical medical and rehabilitation problems are considered

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the proximal interphalangeal joints and in enlarged wrists knees and ankles The ranges of motion of the involved joints become limited



FIGURE 27 Rheumatoid arthritis Inflamed swollen wrist and hand joints

The primary disease process in rheumatoid joints is inflammation of the synovial membrane and effusion which distends the joint capsule At this stage the pathology is reversible and in a small number of cases joint inflammation subsides, systemic manifestations fade away and there is spontaneous recovery More often however only a remission takes place lasting for a few months or sometimes a year before a relapse



FIGURE 28 Synovitis of rheumatoid arthritis involving the knee joint

disease affecting the whole body and that general systemic manifestations of fatigue fever loss of appetite, and loss of weight are commonly present sometimes long before the appearance of joint symptoms The patient may complain of stiffness and pain In the early hours of the morning she will find it hard to turn in bed and her fingers will feel stiff and numb She will have pain in making fists and abducting the arms The grip will be weak Fatigue, weakness stiffness and pain are treacherous symptoms Either the patient will try to ignore them and push herself, or they may cause frustration and depression

Early joint findings (Figure 26) are signs of inflammation swelling heat tenderness and sometimes redness The joint capsule becomes distended by fluid Proximal interphalangeal joints metacarpophalangeal joints and the wrists (Figure 27) are frequently the first to show these signs Weeks or months later inflammation of the elbows, knees ankles and feet may follow (Figure 28) The shoulders and hips are often



FIGURE 26 Rheumatoid arthritis Fusiform swelling of proximal interphalangeal joints

spared The speed of involvement localization of inflammation and its intensity are unpredictable Characteristic of the illness is the progressive extension of joint inflammation by leaps and bounds The classical symmetrical joint involvement is often a late result of the disease

Fatigue weakness stiffness and pain remain the cardinal symptoms with the usual background of fear and depression The patient is bewildered by the up and down course of the illness She feels fine at times and severely handicapped the next day Through the years there are periods of remission and relapses During the periods of active disease joint synovitis is present with effusion resulting in fusiform swelling of

of joint synovitis there is mild diffuse decalcification of the subchondral bones Soft tissue shadows of a distended capsule at a wrist or a knee may then confirm clinical impression of joint inflammation In the more advanced stage gradual cartilage destruction will show itself by narrowing of the joint space Punched out areas of subchondral bone are the roentgenographic evidence of further progression of inflammation destroying bone tissue

One seldom relies however on laboratory and x ray data to make a diagnosis of rheumatoid arthritis A thorough history taking and repeated clinical observations reveal the essential data

Course of the Disease

Besides the classical rheumatoid arthritis of the young female with its insidious onset moderate systemic manifestations and progressive joint inflammation coming by attacks and separated by remissions there are clinical forms where early diagnosis is difficult The disease may start as an acute illness with high fever rapid deterioration of general health and severe joint symptoms On the other hand it is not rare especially in the older age group to see only one or a few joints involved for many months or even years without any apparent alteration of general health Remission is seldom complete although the affected joint may improve for a time Only prolonged observation and further spread of inflammation allow one to distinguish this form from other types of arthritis

Although the course of rheumatoid arthritis is unpredictable the ultimate outcome is not as bad as is often implied It is true that 15 to 20 per cent of rheumatoid arthritics will have severe permanent disability because the disease never burns out or burns out after having crippled the joints and wasted the muscles The rheumatoid invalid with his flexed knees partially ankylosed hips and shoulders flexed and deviated fingers and emaciated body however is fortunately a rare individual (Figure 29)

The majority of patients a good 80 per cent learn to live within the limitations brought on by their illness In the late stages when the pannus of the inflamed joints causes fibrous ankyloses and finally bony ankyloses there are no residual signs of local inflammation but limitation of range of motion and diminished muscle strength The pain then gives way to stiffness and general soreness

The greatest single causes of functional disability are limitation of arm abduction and knee flexion deformity Surprisingly the deformed dislocated fingers and the wrists in ulnar deviation often retain dexterity for performing the activities of daily living and even for wage earning

occurs In other cases the disease never becomes completely quiescent but smolders and produces progressive damage

The state of muscles in rheumatoid arthritis should be emphasized In this generalized disease there is muscle inflammation No specific histological lesions or biochemical changes in muscle tissues have been found, nor are there any characteristic electromyographic changes The patient develops however muscle atrophy of variable intensity Typical of this is the atrophy of the interosseous muscles on the dorsum of the hand Although shoulder synovitis is rare muscle atrophy and subsequent contractures of the shoulder girdle muscles are very common and a major cause of disability Quadriceps muscles lose tone atrophy, and predispose to deformity and disability

Other periarticular structures are affected Rheumatoid tenosynovitis and bursitis are common occurrences Rheumatoid nodules frequently develop on extensor surfaces of the forearms below the olecranon and near the finger joints These seem to result from a combination of connective tissue inflammation and repeated small traumas or pressure

Among visceral manifestations of this disease the heart at autopsy is found to be affected in 40 per cent of rheumatoid arthritics During life however heart disease is rarely detected clinically the lesions remaining minimal and silent

Laboratory and X ray Findings

The blood picture presents a hypochromic anemia of a moderate degree which does not respond to iron or various antianemic preparations It improves when the disease enters a quiescent stage either spontaneously or with treatment The white cells are often moderately increased but may be normal in number There is no change in the differential cell count

Blood chemistry studies show changes in the globulin content There is acceleration of the erythrocyte sedimentation rate and a positive C-reactive protein test Both of these tests are aids in following the course of the illness and the effect of the treatment but they are not specific for the disease entity

In recent years an agglutination test using sensitized sheep cell was found to detect a globulin fraction thought specific to rheumatoid arthritis and thus useful for the diagnosis of early or atypical cases Many variations of this test now are being used Their true value has not been fully elucidated

X-rays of rheumatoid joints lack specific findings In the early stage

of joint synovitis there is mild diffuse decalcification of the subchondral bones Soft tissue shadows of a distended capsule at a wrist or a knee may then confirm clinical impression of joint inflammation In the more advanced stage gradual cartilage destruction will show itself by narrowing of the joint space Punched out areas of subchondral bone are the roentgenographic evidence of further progression of inflammation destroying bone tissue

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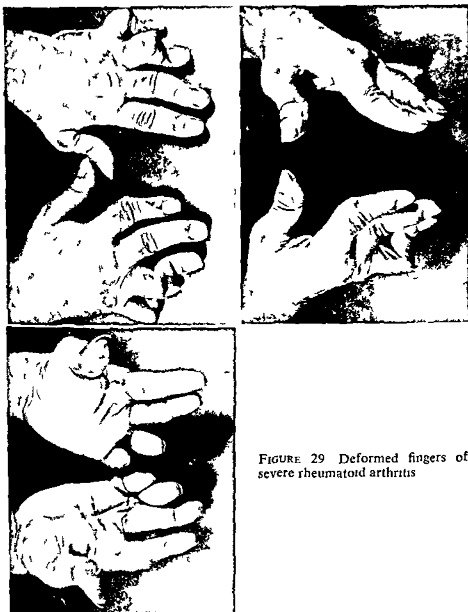


FIGURE 29 Deformed fingers of severe rheumatoid arthritis

Treatment

The treatment goal for patients with rheumatoid arthritis is to relieve fear, fatigue stiffness and pain and to use the available means to halt the progress of the disease The quicker this is accomplished the better will be the outcome

As soon as one is certain of the diagnosis a total program with long range planning should be undertaken The first point to stress is the education of the patient as to the nature of his illness In the treatment team his is the main role and his cooperation is essential The physician guides

the program. Therapists and nurses participate in the active care. The patient should get the feeling of confidence that the situation is well in hand and that everything known to date is being used to limit his plight. A rheumatoid arthritic must be told that the popular notion that there is no cure for arthritis only means that there is no specific quick-acting treatment because of lack of a known causative agent, and he must be assured that judicious management with pharmaceutical and physical means will spell the difference between possible invalidism and comfortable living.

The patient's family should be brought into the treatment team. Their understanding will help avoid frustration and discouragement. The protracted course of the illness with its usual remissions and relapses needs to be explained in order to avoid bewilderment that will destroy confidence.

Invariably the misinformed patient will ask about his diet and about the influence of climate, with the hope that a change of eating habits and of his environment will lead to a cure. There is no specific diet for the rheumatoid arthritic. A well balanced high protein diet is recommended, with vitamin supplements as a supportive measure. Iron and vitamin B_{12} appear valueless for the anemia in this disease and food fads have no place in the proper management of the patient.

Few arthritics escape the temptation of a trip to a warm climate as a cure all. The patient should be warned that the rheumatoid arthritis will be with him relentlessly wherever he goes and that he will need a proper treatment program regardless of location.

There is no better treatment of fear than the understanding and sympathetic attitude of all those concerned with the patient's welfare. The patient's education about his illness should be a continuous process through the years, during remissions as well as during relapses.

The best treatment for the usual complaint of fatigue is properly prescribed rest. This means rest for the whole body as well as for the involved joints. An individualized prescription should balance rest and activity. An average of ten hours of bed rest is desirable, with eight hours at night and two one hour rest periods during the day. The disease is debilitating and the patient often finds it impossible to do a job unless he gets adequate rest. Casual relaxation in a chair is unsatisfactory. Proper positioning of the body and limbs on a firm, nonsagging bed needs to be emphasized. The patient is to assume the ideal rest position if only for a short while several times a day, that is, limbs in extension, folded towel under the lower third of the arms, forearms, and legs, feet

at right angle, and of course no pillow under the knees It is also good to have the patient assume a prone position even for a few minutes at the beginning or the end of his rest period for the prevention of hip flexion deformity A footboard should be used to keep the weight of the blankets from the feet

In prescribing rest in a chair it should be recommended that the seat be higher than average preferably padded and have armrests This will allow the arthritic to get up with more ease and to sit down without flopping When he is sitting for long periods the hands should rest flat on the armrests or in the lap A low footrest should allow frequent extension for the lower extremities

Adequate rest and proper positioning are prescribed and adjusted to individual requirements Some particularly painful and inflamed joints will benefit by intermittent immobilization in splints particularly for night use

A balanced program of rest and activity must be supplemented by relief of pain and stiffness Acetylsalicylic acid or aspirin when given in adequate amounts and on schedule is a good symptom relieving medication in rheumatoid arthritis An average prescription calls for three aspirin tablets (one gram) on awakening and two tablets (0 6 gram) every four hours throughout the day a total of eight to twelve tablets in twenty four hours Those unable to tolerate plain aspirin have a wide choice of salicylate derivatives including coated aspirin buffered aspirin and acetylsalicylic acid combined with other analgesic drugs One should be firm in avoiding narcotics for pain relief in this illness where addiction will only increase the patient s distress Combined with measures of physical medicine (discussed in Chapter 16) these simple analgesics and proper rest are all that is needed for the management of a large number of early and mild cases of rheumatoid arthritis If the disease activity increases and the above described approach is insufficient for control, one is compelled to use the so called antirheumatic agents gold salts adrenocortical steroids and corticotropin

The use of gold salts in rheumatoid arthritis was introduced about thirty years ago by Forestier in France Its acceptance was slow and its exact mode of action is still unknown The patient must be told before the beginning of treatment that it is a long range procedure The effect of gold is low and its benefits will not be apparent for two and a half to three months after treatment is begun About 75 per cent of patients respond with a gradual decrease in signs of joint inflammation and improvement of systemic symptoms A maintenance treatment with this

medication pursued for years helps to avoid relapses Unless this is made clear to the patient he rapidly loses courage and shifts away from a potentially valuable help

Gold is currently used as an injectable salt in water solution consisting of 50 per cent of gold element and is administered intramuscularly at weekly intervals The commonly used schedule consists of injections of 10 mg 25 mg and 50 mg over three successive weeks This last dose is then continued weekly until 1000 mg have been administered At that time the dose is cut to 50 mg every two weeks and after 1500 mg have been reached 50 mg are given indefinitely every three to four weeks

Favorable response starts to show after administration of about 400 to 500 mg in the fortunate three fourths of patients In the recalcitrant 25 per cent who show no appreciable benefit gold should be discontinued after 800 to 1000 mg have been given If a relapse of active disease occurs while the patient is on maintenance therapy dosage is increased and weekly injections are again given until subsidence of inflammation provided tolerance of the drug is good

Because of its potential toxicity gold should not be used casually A fair explanation without undue alarm must be given to the patient and his family It is appropriate to mention that gold is being used when simpler measures fail and that strict supervision will be necessary Each injection is preceded by clinical evaluation and urinalysis Periodic blood counts are done

The most common sites of gold intolerance are skin and mucosae, blood cells and kidneys Rarely is there liver or gastrointestinal involvement A rash due to gold is typically an itchy scaly dermatitis appearing first on the eyelids behind the ears on the neck and trunk An exceptionally severe toxicity will cause exfoliative dermatitis of the entire body and loss of hair Early cessation of drug administration and in severe cases use of an antidote known as BAL (British anti lewisite) or of a corticosteroid preparation brings relief and recovery follows after a few months

A metallic taste or excessive mouth dryness may be the first sign of stomatitis consisting of inflamed gums and lesions resembling canker sores Progressive anemia lowering of polymorphonuclear white cells and the disappearance of platelets resulting in uncontrollable bleeding are serious complications fortunately rarely seen When detected early and treated similarly to the skin reactions they are in the majority of cases reversible

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Urinalyses are done to detect renal toxicity as evidenced by albuminuria and hematuria Persistent abnormal findings require stopping the use of gold

Best results with gold administrations are obtained in patients who develop some toxic reaction The inflammation of the joints vanishes with the appearance of the dermatitis and returns when the toxicity abates When gold therapy proves ineffective in treatment of rheumatoid arthritis or when toxic reactions preclude its further use one must then turn to the corticosteroid hormone preparations

In 1949 the spectacular antirheumatic effect of the adrenal cortical hormone, cortisone was made known by Hench and his collaborators Although it was presented originally as a research tool its unusual and rapid action caught the imagination of patients and physicians alike and overnight it was known as a miracle drug Hydrocortisone was developed shortly after and subsequently a slight change of the chemical formula of these two drugs produced prednisone and prednisolone Additional variations are now available

Corticosteroid hormones are given by mouth in divided doses through the day Their effect is rapid and dependable Pain and stiffness subside within days swelling of joints diminishes within weeks The patient develops a general sense of well being and dreaded fatigue subsides In the early stage of joint synovitis there is complete reversal of inflamed tissues to normal If however destruction of cartilage and bone have taken place no amount of hormone can regenerate these damaged structures When one stops giving the hormone all the disease symptoms and the signs return this is because corticosteroid hormones suppress the disease manifestations but do not cure rheumatoid arthritis

In the early use of these drugs it was common practice to administer large amounts suppressing most or all of the disease symptoms and to try to maintain this state with smaller doses Within days a disabled patient had a sudden hope of recovery Only a relatively small number of patients however continued to feel well on the small well tolerated dose of the hormone The majority required a larger dose which sooner or later caused undesired effects from its hormonal action and the medication had to be stopped The return to invalidism caused further confusion and depression in patients

At the present time oral administration of corticosteroids to rheumatoid arthritics is reserved for those who have a rapidly progressive disease wherein simpler measures and gold therapy have failed The newer corticosteroids are preferable to the earlier hormones because they do not

produce the accumulation of salt and water which results when cortisone and hydrocortisone are used One starts with a small dose and keeps as a goal a partial suppression of the disease compatible with relatively comfortable living If tolerance is good an increase of the dose may sometimes be attempted but the total dose in twenty four hours is kept as small as possible

Some patients especially the very young ones and those in the late decades of life do very well on a small amount of corticosteroids given for months and years The disease process continues and all the general measures of treatment must be employed to prevent disability Because of the suppression of acute inflammation functional activity is greatly increased Close medical supervision is needed to detect untoward hormonal effects and to adjust the dosage to the disease activity

Patients with active peptic ulcer severe hypertensives cardiacs diabetics and psychotics should not be given systemic corticosteroids as all these conditions may rapidly worsen and even prove fatal These conditions may develop insidiously in hormone treated patients who were previously free of them Another common complication which develops chiefly in the middle aged group is progressive osteoporosis

As in the use of gold the calculated risk and the advantages and disadvantages of hormone therapy should be frankly explained to the patient keeping in mind his level of intelligence and understanding

A word should be said about local intra articular use of corticosteroids Injected into the inflamed joints they bring about suppression of heat and swelling pain is decreased and there is better function The effect lasts from several days to several weeks There are no general systemic effects from the small amount of hormone administered It constitutes thus an important adjuvant treatment when combined with other means of therapy

RHEUMATOID SPONDYLITIS

Rheumatoid spondylitis the accepted term in the classification of the American Rheumatism Association is known also by a variety of other names Marie Strumpell disease spondylitis of adolescence ankylosing spondylitis and others

The incidence of the disease is not small About 10 per cent of patients who come to rheumatic disease centers have rheumatoid spondylitis It is primarily a disease of adolescents or young adults which tends to make its appearance at or shortly after adolescence The clinical

troubles usually are manifested in the late teen age or early portion of the third decade when the patient is in military service, in college or is starting out in an adult career

The sex incidence is unusual Approximately 85 per cent of patients are males and in general it is a young man s disease The familial incidence is high (Figure 30) about 40 per cent of the close relatives (children siblings parents, uncles) of patients with spondylitis present complaints referable to the back Some of these back complaints obviously are not due to rheumatoid spondylitis but in one group 9 per cent of the total of close relatives were found to have rheumatoid spondylitis

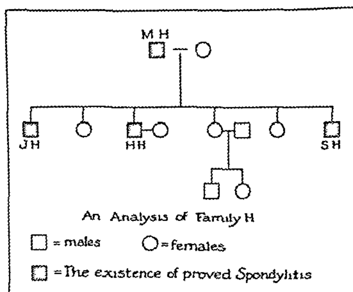


FIGURE 30 Genealogic chart of Family H showing existence of spondylitis in three brothers whose father had rheumatoid spondylitis

The high incidence does not necessarily mean that the disease is hereditary That there is a hereditary factor however seems quite clear from the fact that rheumatoid spondylitis has been observed in twins Despite the fact that they had lived in different environments during the greater part of their lives from early childhood to teen age or past 20 years of age symptoms and signs of the illness began to be manifested at approximately the same time Every time a doctor diagnoses rheumatoid spondylitis he has an obligation to acquaint the patient with the fact that close relatives may have the same disease or may later become ill from it If close relatives present back complaints studies should be conducted to find evidence of the disease or to eliminate the possibility

Clinical Features

Rheumatoid spondylitis usually begins in teen age and seldom begins after the age of 35 years The earliest symptoms are usually intermittent aches and pains in the lumbosacral back in the legs buttocks and thighs These discomforts may be noticed after strenuous activity such as sports or only at the end of an ordinarily active day Sometimes pain first occurs after the patient has been at rest in bed, after many hours of sleep he may be awakened at about four or five o clock in the morning with aching in the legs or low back Relief may be obtained by getting up and walking about The disease progresses slowly but after several months or years the symptoms if they have been intermittent tend to become constant and more severe The pain and stiffness tend to progress from the low back and thighs upward in the trunk, and as time passes, more of the back becomes involved (Figure 31) It may become increas-



FIGURE 31 Early rheumatoid spondylitis showing flattening of the lower spine and early dorsal spine kyphosis

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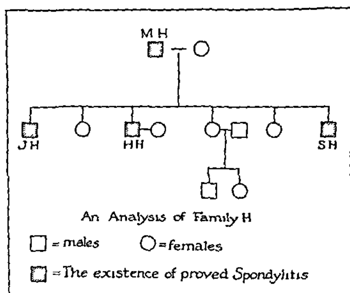


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usual systemic manifestations of a chronic inflammatory illness an elevated erythrocyte sedimentation rate leukocytosis secondary anemia fatigue weight loss Roentgenograms of the spine show abnormalities only after the inflammatory changes have existed for many months or several years They show damage only after it has occurred and do not show early inflammation, hence patients may be seriously ill with spondylitis with no apparent roentgenologic abnormality just as early roentgenograms may fail to show abnormalities in joints affected with classical peripheral arthritis

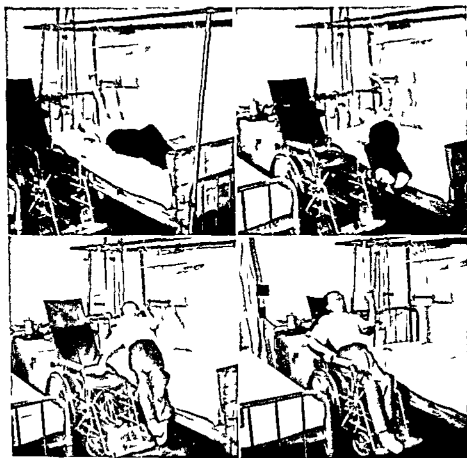


Figure 33 The entire spine as well as the hips of this patient is ankylosed so-called poker or bamboo spine He must transfer and sit in an erect position

The first roentgenographic abnormalities appear usually in the sacroiliac joints and early roentgenographic support for the clinical diagnosis is the changes in these joints The correct diagnosis in most instances can be confidently made before these appear

ingly difficult to pick up things from the floor and to put on shoes and socks because of limitation of motion in the back When the disease involves the dorsal spine the chest oftentimes becomes achy and painful especially upon deep inspiration and there is diminution in expansion of the chest The disease may slowly progress to involve the entire spine With or without treatment, however it may stop at any level and not progress further Thus some patients have involvement of the lumbar back only or of the lumbosacral spine while others have involvement of the entire spine and even of the hips or shoulders

If the disease exists for long the back with its restricted motion may become irreversibly stiff When the spine becomes rigid in a straight position there is little or no incapacity if it ankyloses however in kyphosis, the effect is most unfortunate for this malposition may be very incapacitating (Figure 32) The additional ankylosis of the hips adds to the

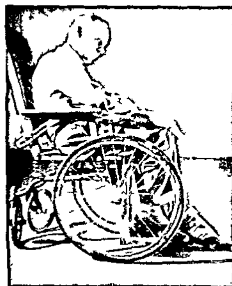


FIGURE 32 Ankylosis of the spine in flexion deformity

incapacity for the patient must be lifted from bed to a sitting or standing position and literally falls from a standing position onto a bed (Figure 33) At least 10 per cent of patients who have spondylitis also develop classical rheumatoid involvement of extremity joints The pathologic features of the affected joints in the back and in the extremities are similar if not identical This is the primary reason why this disease of the spine has been considered to be *rheumatoid* arthritis of the spine or *rheumatoid* spondylitis (see Chapter 3)

During the early stages of the disease the clinical signs include the

usual systemic manifestations of a chronic inflammatory illness an elevated erythrocyte sedimentation rate leukocytosis, secondary anemia fatigue weight loss Roentgenograms of the spine show abnormalities only after the inflammatory changes have existed for many months or several years They show damage only after it has occurred and do not show early inflammation, hence patients may be seriously ill with spondylitis with no apparent roentgenologic abnormality just as early roentgenograms may fail to show abnormalities in joints affected with classical peripheral arthritis

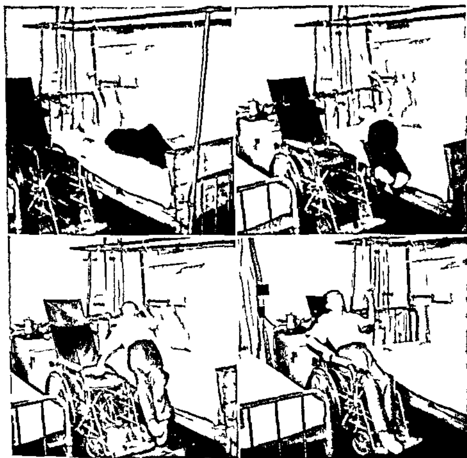


Figure 33 The entire spine as well as the hips of this patient is ankylosed so called poker or bamboo spine He must transfer and sit in an erect position

The first roentgenographic abnormalities appear usually in the sacroiliac joints and early roentgenographic support for the clinical diagnosis is the changes in these joints The correct diagnosis in most instances can be confidently made before these appear

There is considerable question whether rheumatoid spondylitis is the spinal counterpart of classical rheumatoid arthritis Similarities and differences may be tabulated as follows

Similarities

Inflammation at sacroiliac joints facets and hips
Ankylosis common
Often accompanied by typical rheumatoid arthritis
Psoriasis common
Systemic health often impaired (elevated erythrocyte sedimentation rate anemia etc)

Dissimilarities

Predominant in male sex
Onset in adolescence common
Subligamentous calcification prominent
No agglutination of streptococci and sheep cells
Response to treatment chrysotherapy poor roentgen therapy good
Prognosis better when uncomplicated

Inflammation and ankylosis occur in both conditions, peripheral and spinal arthritis coexist in 10 per cent of patients a higher percentage than would be expected by chance Psoriasis is often present in patients with spondylitis as it is in classical rheumatoid arthritis Differences include the great predominance of spondylitis in the male sex (9 to 1) this is a noticeably different sex incidence than in classical rheumatoid arthritis which occurs predominantly in women Other noteworthy differences are shown Response to therapy is different Gold therapy does not help spondylitis roentgen therapy on the other hand is usually beneficial for rheumatoid spondylitis but not for classical rheumatoid arthritis The prognosis is better in spondylitis Thus many features are similar even indistinguishable in classical rheumatoid arthritis and ankylosing spondylitis but there are also many differences Regardless of differences it is important to recognize this spinal disease sufficiently early to establish good treatment

Diagnosis

The approach to diagnosis is obvious from the discussion of the clinical and laboratory features The characteristic symptoms are restriction in motion of the spine and limitation of chest expansion pain is present with these motions There may be evidences also of hip or shoulder joint involvement Laboratory studies show elevation of erythrocyte sedimentation rate and often other manifestations of systemic ill health After

the disease has existed many months roentgenograms show the characteristic changes which leave no question about the diagnosis The chief diagnostic problems exist during early disease before roentgenograms have become characteristically abnormal The problem then requires careful study and astute interpretation of findings Whenever there is doubt the young male between the ages of 16 and 26 years who suffers backache and leg pains, with limitation in motion of the lower back should be diagnosed as suspected rheumatoid spondylitis In 95 per cent of cases, this diagnosis will be right Less difficulty results if early diagnosis is proved wrong than if the disease is not recognized until late in its course

Treatment

Rheumatoid spondylitis is a systemic illness and not just a disease of the joints of the spine It is therefore necessary to treat the patient as a whole and not to confine one s interest to the spine

Generally Applicable Treatment Procedures The first responsibility is to indoctrinate the patient as to the nature of his illness He should understand that it is a severe form of *chronic* arthritis and not something which may produce minor troubles for only a couple of months He should know that the illness may persist for a period of years and that without treatment it can become very much worse to the point of incapacity and serious deformity He should know that response to treatment is slow and he should expect many months of trouble even when the therapeutic management is properly carried out He should also know however that with proper management he may be assured of the best results with minimal deformities or other irreversible changes With such insight his cooperation with the doctor the physical therapist the nurse the orthopedic surgeon and the rehabilitation team will result in a much better outcome

The fundamental measures always to be instituted are

(1) Indoctrination of the patient regarding the disease
(2) Nutrition to maintain ideal body weight
(3) Rest Firm mattress with bedboard
Periods of recumbent rest during the day
Avoidance of strain overexertion and severe fatigue
(4) Analgesia—salicylic acid derivatives
(5) Indoctrination in physical therapy measures and a therapeutic exercise program

Proper nutrition is important but since the disease is not due to vitamin deficiency or other nutritional faults no special diet is of value The diet

should provide proper caloric value to keep the body weight normal or slightly below normal If the patient is obese weight should be lost by using a reduction diet, if he is undernourished a high caloric diet should be prescribed

The patient with spondylitis should have much more rest than a normal individual and it is important that this be obtained in proper positions The bed should be firm preferably with a bedboard between the mattress and springs and without pillows A period of recumbency during the day is wise and more than the usual amount of rest during the night is necessary Strenuous exercises should be avoided to prevent fatigue and strain to the back Therapeutic exercises and the use of physical therapy however are of considerable value and these can be properly coordinated with the program of rest and restricted physical activity (see Chapters 6 7 and 16)

Medicinal relief may often be accomplished by the proper use of salicylic acid derivatives

Special Forms of Treatment The above basic program will be sufficient in many patients to accomplish excellent results Those who have relatively mild disease need no other therapy In general the simplest program of treatment that accomplishes satisfactory results is preferable Special measures should be used only when needed because every special treatment has potential danger and troubles may be experienced regardless of how carefully the special modality is administered If however the disease worsens despite good basic therapy it is usually wise to employ certain special forms of treatment

One means of relieving pain and of improving motion that is inhibited by pain is the administration of phenylbutazone Toxic reactions which may result from this medicine include peptic ulcer, damage to the blood water retention and dermatitis One or more of these complications may appear at any time It is potentially a dangerous medicine and should be employed only when needed and always under very careful supervision More than in most other forms of arthritis phenylbutazone has given good relief to patients with spondylitis, but it must be used with a calculated risk

The benefits and limitations of corticosteroids in rheumatoid spondylitis are comparable to those in classical rheumatoid arthritis Corticosteroids do not cure the disease No more than 60 mg of hydrocortisone, 15 mg of prednisone or comparable doses of other corticosteroids daily should be used for this type of rheumatism To be of significant value corticosteroids must be continued for a prolonged period of time

hence one should decide to use them only when the disease is so severe that expected benefits will be significant and exceed any trouble that may come from prolonged use of this therapy

Another form of treatment particularly helpful for rheumatoid spondylitis is roentgen therapy This is usually very effective in relieving pain and stiffness Benefits can be expected to be greater if therapy is started early in the course of the disease It is less effective in advanced patients Details of this special form of therapy should be managed by a qualified expert radiotherapist Premenopausal women should not be irradiated over the low lumbar region or hips lest temporary or permanent amenorrhea or sterility result from irradiation of the ovaries The well known dangers of roentgen irradiation should of course be evaluated in relation to the potential benefits of treatment Early in the disease before *ankylosis occurs good relief may be obtained in approximately 90 per* cent of patients In the moderately advanced disease there usually is noticeable relief and some improvement in motion but in the late stage only moderate relief of pain can be expected

Until recently braces were used to keep the back straight while the disease was active Partial immobilization of the spine was thereby accomplished, pain lessened and finally disappeared when ankylosis resulted With the current effective means of producing analgesia back braces are seldom needed or helpful

Rehabilitation For the crippled spondylitic patient special rehabilitation techniques are invaluable in restoring functional independence These are discussed in Chapter 18

OSTEOARTHRITIS

Osteoarthritis is a disorder of the joint characterized primarily by a wearing out of its components particularly the cartilage between two bones making up a joint and the ligamentous and fibrous tissue structures supporting the joint Many secondary changes also take place Foremost of these is the production of bony spurs at the joint margins and sclerosis or increased density of bone at the areas no longer properly protected by the worn cartilage (see Chapter 3)

Because of the bony spurs at the joint margins the disorder has often been called hypertrophic arthritis This is an unfortunate term in that it puts stress on the spur formations which are secondary to the basic change cartilage degeneration There are many other synonyms for *osteoarthritis* this term however is preferred because it is merely a designa-

should provide proper caloric value to keep the body weight normal or slightly below normal If the patient is obese weight should be lost by using a reduction diet if he is undernourished a high caloric diet should be prescribed

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degree of osteoarthritis as well as the number of patients who complain of symptoms increases in direct relationship to aging In view of the fact that the population in general is aging and that the expectancy of life of a child born today is at least 67 years it is very obvious that people with osteoarthritic symptoms are becoming increasingly more numerous Those who died at an early age in the past as a result of infections such as typhoid fever and diphtheria now live on to middle and later life long enough for them to develop osteoarthritis

Osteoarthritis is seen in both sexes but appears to be more evident in females Particularly is this true of the so-called Heberden s node which is the result of osteoarthritis of the distal joints of the fingers producing a knobby appearance of these joints (Figure 34) Heberden s nodes may



FIGURE 34 Heberden s nodes

be seen occasionally in young women and occasionally in men at and after middle life, but they are extremely frequent in middle-aged and elderly women Other factors tending to increase the frequency of the number of women who complain of symptoms from osteoarthritis are the poorer body mechanics of many women, compared with men the fact that they in general tend to be heavier and that their fibrous tissue supporting structures are not as strong and give way sooner the effect of pregnancies and the effect of poorly fitting shoes and high heels

No race is immune (Figure 35) The incidence of symptomless osteo arthritis as well as the disorder with symptoms is in general about the same in all races and countries Animals too are not exempt every domestic dog and horse demonstrating extensive osteoarthritis after the age of 5 This applies to wild animals as well as to the prehistoric ones such as the dinosaurs (Figure 36) It is obvious that any joint that moves is subject to wear and when wear takes place the changes called osteo-arthritis can be demonstrated

tion without committing one to a cause and without overemphasizing any one feature of the disease

Osteoarthritis tends to be generalized, starting at middle life but is more advanced in specific areas under unusual stress In addition however, to the generalized or systemic form of osteoarthritis there is a localized type which may be seen at any age Any unusual stress on a particular joint will accelerate the aging of that joint will result in cartilage erosion at an unduly rapid rate and will produce all the other sequelae of the degeneration as seen in osteoarthritic joints A classical example of localized osteoarthritis can be observed in the knee of a foot ball player aged 18 who wrenches his knee injures the semilunar cartilage and walks on this damaged knee for a year or so Due to the abnormal stresses applied its rate of wear will be markedly accelerated and osteoarthritis may develop in this joint while the rest of his joints will be as normal as his age warrants

Incidence

The importance of osteoarthritis not only to physicians but to physical therapists occupational therapists and social service workers cannot be overemphasized It is probable that almost every subject seen who is over 45 years of age will have osteoarthritis in some area of the body to some degree The amount of osteoarthritis present will be extremely variable depending on many of the etiological factors mentioned below but also for many unknown reasons However one can assume with reasonable certainty that every patient one sees over 45 years of age has osteoarthritis, and this must be taken into account in the management of any other condition that he may present

Osteoarthritis however may be and usually is symptomless It is extremely common for spur formation to be demonstrated when one is taking x-rays for other purposes A typical example is the frequency of osteoarthritic spurs on the spine observed during the reading of an x ray of the kidneys If one calls these to the attention of the patient, he will usually be surprised and will disclaim any symptoms in his back However unless he is told that osteoarthritis is a relatively benign condition in most cases the word *arthritis* may set up unwarranted fears as to his future The average person when he hears it visualizes rheumatoid arthritis The differentiation should be thoroughly explained to the patient

Although it is without question that there are many other factors than aging which result in osteoarthritis there is also little question that the

change in his joints may complain of marked joint disability and pain. The factor that incites the symptoms is not always obvious but the usual cause is the application of trauma of one sort or another to a joint already the site of osteoarthritic changes.

The symptoms that follow are pain, particularly after rest such as after sitting a few hours or after a night's sleep, loss of normal mobility, such as the complete range of flexion and extension, sometimes swelling with or without an increase in the intra-articular fluid, and areas of tenderness. There is rarely redness and never suppuration. As a result of the loss of the architectural integrity of a joint due to cartilage degeneration and spur formation, undue stresses are applied to the supporting structures of the joint and inflammation of the capsular ligamentous and fascial tissues results, giving pain and tenderness, often at areas decidedly removed from the joint itself.

Osteoarthritis usually results in no constitutional symptoms. There is no loss of weight, weakness or fever. The sedimentation rate and blood count are normal. There are no rheumatic nodules. There occasionally may be an increase in synovial fluid but it is not of the primary inflammatory type as in rheumatoid arthritis.

In so-called generalized osteoarthritis not all joints equally show signs of degeneration. Those joints which are under maximum stress are apt to show marked changes first. These are usually at the areas of maximum body mechanical stress and include the great toe joint, which is traumatized with each step, the lower cervical spine, the lumbosacral joint, the knees, and the distal joints of the fingers. Other joints may show marked degeneration if there are situations such as special occupations which put unusual stress on particular joints.

Osteoarthritis is slowly progressive, its rate and development depending on many unknown factors but especially on the amount of trauma being applied to a particular movable part. While it sometimes causes pain and a moderate limitation of mobility, it almost never puts the patient in a wheelchair and almost never results in complete loss of mobility such as that from bony or fibrous ankylosis. Only in the spine, where at certain areas the spurs grow together to form bridges between vertebral bones, can ankylosis be demonstrated.

Flexion deformities are common in osteoarthritis and while not as marked as in rheumatoid arthritis they are of great importance and of maximum concern to the physical therapist. They usually yield to properly applied corrective exercises.

Osteoarthritis is not completely preventable but it is now considered

The causes of osteoarthritis are multiple, the most prominent being use and age Other factors however are involved since osteoarthritis can be seen at times in young people Foremost among these other causes must be mentioned heredity which is of great importance It appears that some of us are born with better cartilage than others, cartilage which will withstand wear and tear to a greater degree In addition there must also be other possibly chemical factors, but these are completely unknown Cartilage is high in sulfur content and it may be that its degeneration is related to sulfur metabolism Many other theories have been proposed



FIGURE 35 Vertebral bones of an ancient Egyptian See spur formations at joint margins and bridging at *a*



FIGURE 36 Part of a dinosaur s tail See osteoarthritic excrescences which have bridged the intervertebral space (Museum of Natural History photograph)

Clinical Features

As stated above there may be extensive osteoarthritis demonstrable by x ray which gives no symptoms at least at the time On the other hand, a subject who on x ray examination exhibits a minimal amount of

change in his joints may complain of marked joint disability and pain The factor that incites the symptoms is not always obvious but the usual cause is the application of trauma of one sort or another to a joint already the site of osteoarthritic changes

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Osteoarthritis is not completely preventable but it is now considered

that its development can be retarded Cartilage for health, requires a certain degree of use, but not abuse The college athletic hero who is bludgeoned about a football field for four years is apt to present a veritable museum of osteoarthritis by the time he is 45 On the other hand, too little use of joints results in the absence of the milking effect apparently necessary for cartilage to receive its nourishment from the sub chondral bone and synovial fluid, hence the marked osteoarthritis often seen in some subjects who have always been sedentary and protected from stress Other factors of prevention are the maintenance of a normal weight good body mechanics (Figure 37) attention to functional derangements of the feet, the use of proper shoes and the control of emotional strain which results in muscle tensions and joint stress This program of prevention obviously at the present time is a matter of accident as it must be instituted in early youth long before one s thoughts are concerned with osteoarthritis

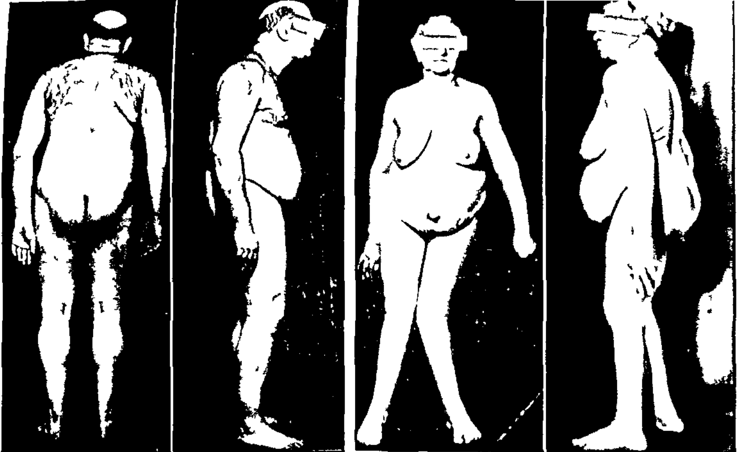
Treatment

Of primary importance in treatment is the application of rest in general and locally to the part involved Usually the advice to lead a sedentary life and to avoid excessive use and weight bearing particularly by the parts exhibiting symptoms, is enough but in special situations rest may be augmented by the application of bandaging splints braces, and at times operations Maximum rest is of course implied in arthrodesis operations where the joint is fused and total movement is eliminated

Another form of rest is the avoidance of trauma of all sorts as applied to joints This includes dynamic trauma the application of force from without the body static trauma the result of poor body mechanics and microtrauma the minute traumas of daily living and working

Dynamic trauma can usually not be controlled and includes such conditions as being hit by a truck Static trauma however, is to a large extent preventable and reversible and it is in this field that the physical therapist can play his most important role Exaggeration of the normal postural curves abnormal increases in body weight derangements of the functional capacity of the feet the static traumas of occupation and sports are all included in this category

An extremely important cause of symptoms in osteoarthritis is the effect of excessive weight It is essential to bring the patient down to or close to his normal weight if at all possible without disturbing his emotional health Many people eat beyond their needs because of habit but



A

B

FIGURE 37 A Poor body mechanics aggravate and localize osteoarthritis Note exaggerated normal postural curves obesity flat feet B Orthopedic derangements cause and are caused by osteoarthritis Note marked knock knees obesity poor body mechanics

also because eating is sometimes a substitute for some emotional need or conflict This explains the frequent failure in trying to reduce some people, and also the dangers involved where the eating is on an emotional basis and the patient's self applied solution is taken away without substituting something effective in its place

Specific diets for arthritis are not scientific There are no foods known to make osteoarthritis worse In recent years there has been a great deal of stress on fats as a potential cause of arteriosclerosis There is no evidence however that fats affect osteoarthritis either for good or ill The same applies to carbohydrates proteins, and minerals It is essential however that the patient receive a balanced diet with an adequate amount of protein and vitamin content

Osteoarthritics being in middle or late life and often exhibiting some degree of arteriosclerosis are apt to do better in a warm climate during the winter months Their circulation is not as mobile as it was in the past and is less able to adjust itself to changes in the outside temperatures and other environmental factors However while the osteoarthritic may lead a more comfortable life in a warm rather than a cold climate, it is quite certain that climate is not in any sense curative

Salicylates are always a comfort in that they have an analgesic effect It is better to use a sodium free salicylate such as aspirin, in that the sodium radical tends to promote water retention and any increase in the swelling of tissues will aggravate the pain It is improbable however, that salicylates have any curative effect on osteoarthritis

Adrenal hormones by mouth or parenterally as a rule have no place in the treatment of osteoarthritis The side effects are usually more serious and destructive than the disease itself Only when given locally where a small dose only is necessary can the use of the adrenal hormones in osteoarthritis be justified

In recent years the instillation of hydrocortisone into the joint itself has been very effective in allaying symptoms In a disease like osteoarthritis which is episodic in its symptomatology even though the basic changes are irreversible and progressive the use of an anti inflammatory agent such as hydrocortisone has a useful place and commonly can cut short the acute superimposed traumatic arthritis which is giving the symptoms

Physical therapy is the most important single treatment for osteoarthritis particularly if physical therapy is considered in its broadest sense Heat massage and various forms of electric therapy are comforting but probably of minimal effectiveness compared with a properly

devised adequately taught and thoroughly followed-out program of corrective exercises (see Chapters 6 7 and 16)

PSYCHOGENIC RHEUMATISM

Psychogenic rheumatism is an oft encountered and frequently mis diagnosed syndrome among patients presenting themselves with the com plaint of arthritis Among patients seen in general arthritis clinics incidences of psychogenic rheumatism have been reported ranging from 15 to 40 per cent Because of the magnitude of the problem and the generally good prognosis as compared with the organic arthritides, and because most eventually come into the hands of physiatrists for treat-ment, it is important that the syndrome be clearly appreciated

Definition

Psychogenic rheumatism is a muscular response to the stress of emo tional tensions and physiologically is probably a manifestation of muscular fatigue It is therefore a functional rather than an organic process and is pathologically unrelated to the organic arthritides It may occur as a functional overlay concurrent with organic arthritis but it occurs alone with such preponderant frequency that as a rule of thumb the diagnosis of psychogenic rheumatism usually rules out the presence of an organic arthritis process Because of the totally different approaches to therapeutic management the two should be sharply delineated in the early differential diagnosis

Etiology

It is a well established fact that the muscular system is frequently the expression level for the emotions Recent studies of the effects of emo-tional stress have shown greatly increased oxygen consumption by the brain during periods of anxiety or apprehension The corollary assump-tion that increased muscle tone secondary to emotional stress entails a similar increase in metabolic needs and readier fatigue of muscles is hypothetical but generally suspected Increased muscle tone as the result of emotional stresses is a normal physiological response of the vegetative system so long as this vegetative response is mobilized intermittently in fear anger and other normally transient emotional reactions When the muscular system is called upon for sustained reaction the result is a dysfunction of the responding system psychogenic rheumatism is the result This is one of the group of abnormal vegetative responses termed

also because eating is sometimes a substitute for some emotional need or conflict This explains the frequent failure in trying to reduce some people and also the dangers involved where the eating is on an emotional basis and the patient s self applied solution is taken away without substituting something effective in its place

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If the underlying systemic process accounting for the fibrositis is clinically apparent such as rheumatoid arthritis or lupus erythematosus or chronic gouty arthritis there is no problem in diagnosis It is in those cases of true fibrositis without objective clinical findings that differentiation from psychogenic rheumatism requires more astute diagnostic acumen Hench has described the fibrositic patient as the victim of the external environment (weather heat cold rest exercise etc) as contrasted with the psychogenic rheumatism patient whose symptoms fluctuate with changes of the internal environment (mood changes pleasure, excitement worry fatigue etc)

The patient with true fibrositis presents a typical clinical picture The muscle discomfort is of a jelling character worse after any period of inactivity Consequently the patient is most disturbed at night when at rest There is no difficulty in getting to sleep but after one two or three hours of rest sleep is interrupted by the aching of inactive jelled muscles Moving about gives temporary relief and the patient falls off to sleep again only to awaken repeatedly thereafter through the night In the morning the aching is pronounced and prompts the patient to crawl out of bed so that he may move about and warm up This limbering up period may extend into the middle of the day or require only part of an hour With continued activity through the day the patient feels progressively less achy and towards evening and night is most free of symptoms Prolonged sitting during the day produces jelling and symptoms and the patient is unable to sit comfortably through a movie or the like With barometric changes of the weather or exposure to the cold of drafts or air conditioning there is accentuation of symptoms Salicylates invariably provide some relief

Conversely the psychogenic rheumatism patient presents quite a different clinical picture While this patient may have some morning stiffness it is not true jelling prompting the patient to be up and out of bed for comfort on the contrary it is more of a fatigue stiffness and tiredness and the patient would just as soon remain lazily in bed This stiffness dissipates quickly with the mounting pressure and tempo of the morning As the day proceeds however muscle aching accrues in direct measure with the tensions and pressures of the day and by afternoon the patient is most aware of his pains There may be some restlessness and difficulty in getting to sleep but once asleep the patient sleeps soundly through the night Weather has no effect, nor does cold and salicylates are less effective than in fibrositis

Clinically psychogenic rheumatism may produce muscle aching and

vegetative neuroses Ruesch has pointed out that these vegetative or visceral neuroses are manifestations of an infantile personality Such persons are unable to dispense emotional tensions through adult interpersonal relationships and other mature vents and as a consequence suffer the cumulative effects of this closed system viscerally Such visceral expression stems deep into the development system of the psyche and is far more refractive to treatment than more mature conversion mechanisms The patient with psychogenic rheumatism is thus usually the tense anxious, nervous individual with or without dynamicism whose psyche is deeply scarred from previous and persisting traumas

Incidence

Statistically Hench and Boland found that of 1000 consecutive patients admitted to the Army Rheumatism Center at Hot Springs, Arkansas, during World War II 20 per cent had psychogenic rheumatism In another series of 450 cases Boland reported that one-third presented psychogenic disorders Halliday noted a 40 per cent incidence among another group In the light of this high incidence and in view of the psychological roots of the problem early diagnosis and proper management assume paramount importance if the patient is to be salvaged from an even more deeply rooted neurosis and disability

Clinical Features

Like other functional disorders psychogenic rheumatism presents no pathological findings demonstrable histologically roentgenologically, or by other laboratory methods Similarly physical examination reveals no related objective findings The disorder is totally a subjective one

In establishment of diagnosis the one condition which poses a troublesome question in differentiation is fibrositis While some writers categorize fibrositis broadly into two types primary and secondary there is growing support for restricting the use of the term Fibrositis is an inflammatory process involving the fibrous constituents of muscle One rheumatologist prefers to think of this fibrositic process as the smoke signal from the fire of an underlying systemic disease process whether the latter be clinically identifiable or not We agree with him in this restricted use of the diagnosis and because of the serious implications of the diagnosis prefer not to minimize the prognostic implications by associating it with the wastepaper basket of entities usually called primary fibrositis The differential diagnosis then rests between psychogenic rheumatism and secondary fibrositis of obvious or obscure cause

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stiffness in localized areas but more often involvement is disseminated Frequently the muscle pains are migratory and bizarre in distribution The upper spine, especially the occiput, the cervical and the dorsal regions most commonly are symptom sites but any area may be involved

Treatment

Psychogenic rheumatism may be acute in onset or it may develop insidiously as a chronic process The acute syndrome usually follows in the wake of overwhelming and unusual stress In a mild degree, this has probably been experienced by most persons in the exhaustion following family emotional crises difficult interviews examinations, and the like With the removal of the precipitating emotional stresses, the muscular system is released from tension and the visceral symptoms dissipate Understanding by the patient of the underlying mechanism causing the muscular symptoms is important lest his concern over the rheumatism add further emotional stress to the system The definitive approach to treatment obviously is the alleviation or elimination of the psychic stresses while palliatively treating the distressing subjective symptoms

The chronic process constitutes a more complex treatment problem In every instance however it is imperative that a warm physician patient relationship be established if the patient is to be supported psychologically in his efforts to gain insight and adjustment to his problem The average patient when first seen usually will have learned by experience the noxious effect of emotional stresses and tensions even though he may not have intellectually accepted a cause result relationship The problem always rises as to the advisability of psychotherapy One psychiatrist has wisely said Don t take the lid off until you know what s in the pot a monster may jump out that can t be got back in Psychoanalysis and psychotherapy too glibly have come to connote cure of mental ills and in some quarters there is strong feeling that a good five cent psychiatrist would cure the world of its ills

Clear thinking psychiatrists are well aware of this misconception and do not concur They have pointed out that mental illnesses are not all or-none propositions that the reversibility of mental difficulties depends largely upon the depth of their roots and that psychopathologic changes may be as intractable as a stenosed aortic heart valve or a sclerosed renal glomerulus Appreciation of this is imperative for a reliable estimate of a patient s situation Ruesch points out that the treatment of the infantile personality as seen in psychogenic rheumatism is actually child psychology for a chronologically adult person and that therapy is a pro

tracted undertaking in an endeavor to effect maturity Such an individual has not regressed from a mature to a less mature state of reaction but is exhibiting a facet of his personality that has not matured Not only must he develop insight into his immaturity but he must then be helped to grow and to develop adult reaction mechanisms much as a child is helped in its progress towards a mature mind It does not seem logical then to subject a patient to such psychiatric upheaval so long as he is a compensated and functioning unit of society

The wiser approach is probably a superficial supportive one for the palliation and understanding of his discomfort In these cases it is helpful to give the patient some insight into his difficulty by acquainting him with neuromuscular functional interrelationships and the consequences of emotional tension, the use of such commonly recognized analogies as tension headaches nervous indigestion and spastic colitis renders this explanation of psychogenic rheumatism more tenable In accepting this tension relationship he accepts the personal responsibility for his difficulty and cannot transfer hopes for cure to the physician Supportive assurance that much can be done in a palliative way should then be extended and discussed This entails adoption of a program of physical therapy sedatives salicylates extra rest and a plan for avocational outlets Of no small importance is the fostering in the patient of an insight which no longer tolerates fear of crippling or extension of the process On such a program many patients will stabilize satisfactorily and will learn to adapt to their personality penalties through the use of these palliative crutches

In a small percentage of cases the immaturity and neurosis will be so profound that the patients will be incapacitated from their psychogenic rheumatism The prognosis for these patients is extremely poor Insight is not readily instilled or accepted and the patient presents himself as a refractory functionless unit The psychotherapeutic approach here is the only productive one The aim need not and probably should not be the maturing of the infantile individual rather the effort should be towards effecting adequate insight for compensation to a functionally useful level Though this is more readily said than done, it may nonetheless be the sole recourse for salvaging the severe psychosomatic cripple

PART TWO

Physical Medicine and Rehabilitation Treatment of Arthritis

5

Range of Motion Testing and Exercises

ESTHER MARTON

Range of motion implies both the testing and the application of exercises for joint movements The purposes of range of motion exercises in arthritis are (1) to maintain joint ranges for prevention of deformity, and (2) to increase joint ranges and thus correct deformities which already exist

COMMON DEFORMITIES

In rheumatoid arthritis certain deformities are commonly encountered (Figure 38) The first evidence of the disease often develops in the proximal interphalangeal joints and from there spreads to other joints Flexion deformities of the metacarpophalangeal joints with hyperextension of the proximal and distal interphalangeal joints are common The wrist is usually held in flexion and ulnar deviation Flexion and pronation deformity is most likely to occur at the forearm Many movements of the shoulder joint may be involved with loss of ranges of motion in abduction flexion and internal and external rotation In many instances abduction and flexion to 90 degrees may be actively and passively accomplished by the patient but the range from 90 degrees to 180 degrees which includes scapular rotation is limited External rotation of the shoulder usually is restricted to a greater degree than is internal rotation

In the feet the toes are often in lateral deviation the metatarsophalangeal joints in contrast to the hands are usually in hyperextension rather than in flexion The distal interphalangeal joints may or may not be affected Inversion and eversion of the foot are limited with inversion being more limited than eversion At the ankle limitation of dorsiflexion is often present At the knee flexion and extension may be impaired,

Charts Used for Recording Ranges of Motion

NAME ____________________ AGE ______

DISABILITY ______ DIAGNOSIS ______ EN ____ IT ____

RANGE OF MOTION TEST FOR UPPER EXTREMITY

Sho lde

Fle on	0 90
Fle on and ota ton of scapula	90 180
Exte s on and rota to of scapula	180–90
E te sio	90 50

Lim tatio s

	L		R	
	Fl.	E t	Fl	E t
1				
2				
3				
4				

Sho lder

Abduct on	0 90
Abduct on and rota ton of scapula	90 180
Add ct on and rota ton of scap la	180–90
Add ct on	90– 0

L m t o s

	L		R	
	Abd	Add	Abd	Add.
1				
2				
3				
4				

INT EXT

Shoulder Rotat on

Elbow fle ed	90°
Extens on rotation	0 90
ternal rotat on	0–90

L m tat o s

	L		R	
	I t	E t	I t	E t
1				
2				
3				
4				

EXT INT

E bow

F	0 145 160
E	160 145– 0

L m o

	L		R	
	F e	Ext.	F ex.	E t
1				
2				
3				
4				

PRON SUP

Rad e

Pro at on	0 90
S p nat on	0–90

L m t t

	L		R	
	Sup	Pron	S p	Pron
1				
2				
3				
4				

SUP PROC

DORSAL VOLAR

W st Fe

Ds sa F on	0 73
Vo ar Fle on	0 90

L m t

	L		R	
	D		D	V
1				
2				
3				
4				

VOLAR DORSAL

ABD ADD

W st

Abduc on	0 25
Adduc on	0 55 65

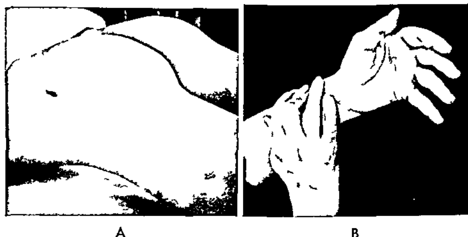
L m t

	L		R	
	Rad	U	Rad	U
1				
2				
3				
4				

A D ABD.

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2	2	
3	3	
4	4	

the last 15 to 20 degrees of extension is the most difficult and at the same time the most vital range of the knee to maintain The hip, like the shoulder may develop limitations of several movements, flexion abduction, and external rotation contractures are most often encountered



A B

FIGURE 38 Typical deformities of rheumatoid arthritis A Knee flexion contractures B Ulnar deviation and flexion deformity of hands

In rheumatoid spondylitis loss of ranges of motion in the lumbar spine develop first the earliest range loss is in hyperextension With progression of the disease upward the dorsal and cervical ranges become impaired The major deformity threat is that of fixed kyphosis In the cervical spine rotation flexion and/or extension may be limited

CHARTING RANGES OF MOTION

Any combination of these common deformities may be seen in the arthritic patient Many of them can be improved or prevented by adequate range of motion exercises Keeping an accurate measurement of ranges of motion is the only means of determining whether a patient is progressing or regressing and of evaluating the beneficial effect of the physical treatment he is receiving For this reason it is important to be familiar with range of motion charts the interpretation of the charts and the testing procedures used These unfortunately vary from facility to facility and are in need of some standardization The range of motion chart which is used at the Institute of Physical Medicine and Rehabilitation (see pages 71–73) is one example of the many test forms being used throughout the country This is a rather bulky test but it includes very desirable visual aid graphs which tend to negate the possibility of misinterpretation of the test results

NAME ____________________ AGE ______
DISABILITY ______________ DIAGNOSIS ______________ UT ______

RANGE OF MOTION TEST FOR FINGER AND TOES

1 Anatom l h ude 0 ng n. Range 0 mea ure motion are f om th d al l ne 0 ° l tere l ne 180°

2. If on are sed pa ve range f motion heck mu hert att hed for l on d h hims eakne on, w ntrac ure

3 The sc l d ld d nt of 10 Rang f met orded h 1 11 area 1 range

d ro tl on hed her h h date nd nor l

4 Use l heet for b quent to rec rdi d we w nd dated ord ng!

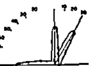
5 R gre l marked b d gen l l ne ver are f re ou te nd de d.

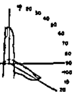
6. If on her hen h tch, ind cate $ for up ne P for rome.



F nger M.P

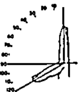
Fl i								0 90
Exten i								0 –20 30
	Limitations							
	L				R			
	Fl	Ext	Fl	Ext	Fl	Ext	Fl	Ext
1	II		III		II		III	
2								
3								
4								
1					IV		V	
2								
3								
4								

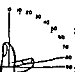




F'ngers I P Prox

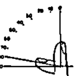
Fle ion								0–120
Extension								120– 0
	Lim tat ons							
	L				R			
	Fl.	E t	Fl.	E t.	Fl.	E t.	Fl.	E t.
1	II		III		II		III	
2								
3								
4								
1	IV		V		IV		V	
2								
3								
4								

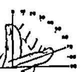




F nge s I P Distal

Fle ion								0 – 80
E tension								80 – 0
	Lim tat ons							
	L				R			
	Fl.	E t	Fl.	Ext	Fl.	Ext	Fl.	E t.
1	II		III		II		III	
2								
3								
4								
1	IV		V		IV		V	
2								
3								
4								





Th mb M P

Fle o				0–60–70
E tens on				70–60– 0
	L m tat o s			
	L		R	
	Fl.	E t.	Fl.	E t
1				
2				
3				
4				

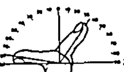




Thumb I P

Fle on				0–90
Extens on				90– 0
	L m tat o s			
	L		R	
	Fl	E t	Fl	E t
1				
2				
3				
4				

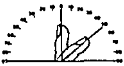




Toes M P

Fle on				0–25 35
E tension				0 80
	L m at o s			
	L		R	
	Fl	E t	Fl	E t
1				
2				
3				
4				
5				





To s I P.

Fle o				0 50
E te s on				50– 0
	Lim at o s			
	L		R	
	Fl.	E t.	Fl.	E
1				
2				
3				
4				



P YSIC L THERAPIST	COMMENTS	DATE
1	1	
2	2.	
3	3.	
4.	4.	

Charts Used for Recording Ranges of Motion

NAME ____________________ AGE ______

DISABILITY ______ DIAGNOSIS ______ IN ____ OUT ____

RANGE OF MOTION TEST FOR LOWER EXTREMITY

1. Anatom l on or ng po ion. Rang mea ured h ude 0° or um Rotat mot on re ive h d al ne 0° l or l ne 180°
2. All ang are ...ured range f mo on. Check ... hort h d fo te um ... b him ... ...on, ... contracture.
3. The ... d ded mo un of 10 R nge mot on recorded b l ... re ... ge direct ... ed ... h date and ... l
4. U f ... for ... quent ... ed ... or nd der ... or
5. Retrog ... ark d b d agonal l ver or l pro ... al and d
6. If po ion other ... ket h, nd ... for ... for prone.

Hip			
Fl (st ght knee)	0	90	
Fle io (be t k e)	0	115	125
E te s o	0	10–15	
E t on a d l mbar p ne	0	15	45

Lim tatio s

Fl o (straight k ee)

	L		R	
	Fl.	E t.	Fl.	Ext.
1				
2				
3				
4				

Fl io (bent k ee)

	L		R	
	Fl	E t	Fl.	E t.
1				
2				
3				
4				

Extension

	L		R	
	E t	EBL	E t.	EBL
1				
2				
3				
4				

H p

Abd ct on	0	45
Add ct o	0–45	

L m tat o s

	L		R	
	Abd	Add	Abd	Add
1				
2				
3				
4				

H p (b t k ee p o e)

E te nal rot t	0	45
I te al rotat on	0	45

L m t t o s

	L		R	
	I t	E t	I t	E t
1				
2				
3				
4				

INT EXT EXT INT

K ee

Fl o (po)	0	120	130	
E t ns o		130	120–	0

L m tat o s

	L		R	
	Fl	E t	Fl	E t
1				
2				
3				
4				

A kle

Fl o	0	20
E te s o	0	45

L m tat s

	L		R	
	Fl	E t	Fl	E t
1				
2				
3				
4				

PLANTAR DORSAL DORSAL PLANTAR

F t

E e s o	0	25
I e s o	0–35	

L m t t o s

	L		R	
	E	I	E	I
1				
2				
3				
4				

EV INV EV INV

PHYSICAL THERAPIST	COMMENTS	DATE
1	1	
2	2	
4.	4.	

process of the vertebra at the apex of the kyphosis, (3) the posterior process of the fifth lumbar vertebra

A calibrated water level ruler is used The degree of kyphosis and lordosis is computed by taking the apex of the kyphosis as reference 0 and reading and subtracting its distance to the plumb line from the other distances

EXAMPLE

Reading on Ruler	*Referred to Apex 0*
7 cervical—7 inches	6
Apex (kyphosis)—1 inch	0
5 lumbar—5 inches	4

The testing of trunk and head movements by manual means is very difficult The most accurate but also an expensive means of measuring these movements is by x ray

NORMAL MOVEMENTS OF JOINTS

In instructing patients in maneuvers which will carry joints through full excursions of their ranges of motion the following directions are helpful

HEAD

(1) Bend head forward
(2) Bend head backward keeping chin in
(3) Bend head toward left shoulder then straighten Bend head toward right shoulder then straighten
(4) Turn face to left side then face forward Turn face to right side then face forward

TRUNK

(5) Bend body forward
(6) Bend body backward keeping abdominal muscles retracted
(7) Bend body left then straighten Bend body right then straighten
(8) Twist body left then forward Twist body right then forward

SHOULDER

(9) Raise arm forward and upward
(10) Raise arm sideways and upward
(11) Put palm of hand on back of neck then bring hand down under arm touching back of hand to shoulder blade

ELBOW

(12) Bend arm until finger tips touch shoulder then straighten arm

MEASUREMENT METHODS

With any joint measurement, the important factors to keep in mind are the accuracy of the test and the ease with which it may be repeated It is always necessary, therefore, when measuring a range of motion, to place the axis of the goniometer over a point which will be stationary for all subsequent tests The measuring of ranges of motion of the extremities is well established procedure this need not be reported here The testing however, of the head and trunk movements often is omitted from many range of motion tests These latter movements can be graded

The following methods may be used for measuring head and trunk ranges of motion

Head Rotation The axis of the goniometer is placed at the jugular notch and lined up with the chin As the head rotates the arm of the goniometer moves with the chin and the angle between the arms of the goniometer is measured

Lateral Flexion of the Head The axis of the goniometer is placed at the seventh cervical vertebra and is lined up with the external occipital protuberance As the head flexes laterally one arm of the goniometer moves with the occipital protuberance and the angle between the two arms of the goniometer is measured

Flexion and Extension of the Head (The flexion and extension being measured is actually a combination of movement at the atlanto occipital and the cervical joints) The axis of the goniometer is placed at the tip of the acromion process and is lined up with the lobe of the ear As the head flexes and extends one arm of the goniometer moves with the ear and the angle between the two arms of the goniometer is measured

Flexion of the Trunk (These measurements are a combination of back and hamstring measurement)

Standing The patient reaches for the floor with his hands and the number of inches from the tip of his long finger is measured

Supine The patient flexes his trunk from the table and the distance from the inferior angle of the scapular is measured in inches

Standing using plumb line As the patient reaches for the floor the distance from the plumb line to the seventh cervical vertebra is measured

Dorsal Kyphosis and Lumbar Lordosis These are gauged by taking three measurements with the patient placed with his back to a plumb line The measurements are the distances from the plumb line to (1) the posterior process of the seventh cervical vertebra (2) the posterior

6

Principles of Therapeutic Exercise

JACK HORKOSH

Therapeutic exercises constitute an essential part of the treatment program for the patient with arthritis (See also Chapter 7) These exercises if begun early and continued diligently can prevent much of the crippling effects of the disease A therapeutic exercise program is directed mainly at activity for specific groups of muscles and movement of specific joints to maintain muscle power and normal ranges of motion of the joints under treatment

It is for the physican to prepare as detailed a prescription as the case calls for with subsequent re examinations at regular intervals and changes in prescription as improvement or worsening is seen

The physical therapist must appreciate fully his roles as therapist and as teacher in order to

(1) Understand the objective of treatment so that a proper interpretation of the prescription can be made

(2) Report back to the physician any reactions to the treatments such as increased pain, swelling or stiffness

(3) Grade the exercises according to the patient s muscle status and tolerance and to increase these as progress is made

(4) Teach the patient and his family a program that is simple enough to be understood and to be used in the home

(5) Impress upon the patient and his family the balance between *rest* and exercise

Therapeutic exercises may be divided into three categories based on the qualities of muscle needed for good functioning These qualities are *power* or strength *elasticity* or ability to contract and relax, and *co ordination* for purposeful smooth motion The types of exercises to develop each of these qualities are respectively *strengthening* exercises, *stretching exercises* and *coordination* exercises

FOREARM

(13) Elbow bent to a right angle with palm down turn palm up then turn palm down

WRIST

(14) With palm facing down move hand up then move hand down
(15) Move hand toward thumb then toward little finger

FINGERS AND THUMB

(16) Bring tips of fingers to palm of hand then straighten fingers
(17) Spread fingers wide apart keeping fingers straight then bring fingers together
(18) Keeping fingers straight bend hand at knuckles
(19) *Bend thumb to center of palm keeping thumb close to hand* then straighten thumb
(20) Place thumb in front of forefinger bring thumb straight out then bring thumb back to forefinger
(21) Touch tip of thumb to tip of little finger open hand wide Do this with each finger

HIP

(22) Bend hip with knee flexed
(23) Move leg backward as far as possible keeping knee straight then return it to starting position
(24) Move leg out to side as far as possible keeping knee straight and toes pointed straight ahead then return it to starting position
(25) Sitting with lower part of leg hanging down move one foot inward across other leg rotating thigh outward
(26) Sitting with lower part of leg hanging down keeping knees together move one foot away from other foot rotating thigh inward

KNEES

(27) Bend knee as far as possible then straighten leg

ANKLE

(28) Bend foot up
(29) Bend foot down
(30) Turn foot in
(31) Turn foot out
(32) Turn foot in and up with toes bent down

TOES

(33) Bend toes down
(34) Bend toes up

FIGURE 39 A Active assistive exercise utilizing the mechanical help of a pulley B Active assistive exercise utilizing the buoyant hydrotherapeutic effect of a Hubbard Currance tank C Active assistive exercise utilizing the mechanical assistance of a powder board



A



B



C

In arthritis, one is concerned not only with these specific qualities of muscle function but also with the effects of the disease on the other component parts of the joint structures In the early stages of a deformity for example the extremes of the ranges of motion of the joint insidiously become restricted Treatment, therefore, must be directed not only towards maintaining the quality of muscle function but also towards maintaining the ranges of motion of the joint as close to the normal as possible

For the arthritic, exercise goals are threefold

(1) Prevention of deformity
(2) Maintenance of muscle strength
(3) Maintenance of useful function of the joints

TYPES OF EXERCISES

Therapeutic exercises used in an arthritis program are classified as Static Passive Active Assistive Active and Resistive, including progressive resistive Each type of exercise must be individually prescribed by the physician to be carried out by the physical therapist or by the patient

Static Static (muscle-setting) exercises are used to maintain strength while the patient is confined to bed or chair A static contraction is an isometric contraction in which the length of the muscle remains the same and no joint movement is produced Static exercises to prevent atrophy and weakness of the gluteal muscles and the knee extensors are especially important for the arthritic patient because these muscles are used in ambulation climbing and transfer activities The patient should know their location and their function in keeping the hips and knees in extension Doing static exercises six to twelve times a day will assist in preventing atrophy A well informed patient who knows how to help himself with such a daily exercise program is well ahead in his total treatment regimen

Passive Passive exercise is usually accomplished by the physical therapist and is helpful towards retaining as much joint range of motion as possible during the acute inflammatory stages of the disease In this procedure the therapist carries the joint through its full ranges of motion without assistance by the patient This type of exercise may be combined with some moderate stretching to assist in restoring range to normal where restriction of motion has developed Stretching to be effective,

a powder board (Figure 40) with the part supported and gravity eliminated is often helpful in building strength preliminary to antigravity exercise

Resistive, Including Progressive Resistive In performing this type of exercise the patient actively carries the joint through its range of motion while the therapist resists in a slight to marked degree, depending upon the power of the patient s muscle Instead of the therapist s offering this resistance weights (sandbags Figure 41A and boots Figure 41B, with attached disc) may be used and progressively increased as power and endurance are built



A B

FIGURE 41 A Resistive exercises utilizing various weights of sandbags B Resistive exercises utilizing a boot with attached disc weights

The Arthritic Hand The extrinsic and intrinsic musculature of the arthritic hand deserves special attention in the therapeutic exercise program Imbalance in these muscles of the hand usually occurs early and is an important factor in producing deformities The flexors and especially the extensors of the fingers also must be afforded similar diligent care to prevent deformity and to preserve as much useful function as possible Combinations of active assistive active and resistive exercises must be used to strengthen the finger and hand musculature

must be carried into the range of pain, it should not be so strenuous as to precipitate pain which persists beyond a few hours

Active Assistive Active assistive exercise is prescribed when there is some amount of joint limitation as well as muscle weakness in and around the involved joint It is employed to increase the ranges of motion of the joints and to assist in the strengthening of the muscles so that active exercises may be done It is accomplished by the physical therapist at first, as a guiding action with some active assistive effort on the part of the patient Substitution movements are to be avoided as much as possible during this phase of the treatment regimen Mechanical or hydrotherapeutic modalities are often used for the additional assistance they provide (see Figure 39 A B C) Too strenuous exercise during this phase may result in increased pain and stiffness and should be modified to prevent this It is well to remember to begin the exercise program with short periods of activity and to follow each with an adequate rest period As the patient s tolerance improves the exercise periods are increased accordingly but still with allowance for adequate rest periods



FIGURE 40 Use of a powder board with part supported when muscle weakness makes movements against gravity impossible

Active Active exercise denotes free movement by the patient without assistance from the therapist In an active exercise program the patient necessarily assumes full responsibility If moving the part independently against gravity is impossible because of weakness the use of

a powder board (Figure 40) with the part supported and gravity eliminated is often helpful in building strength preliminary to antigravity exercise

Resistive, Including Progressive Resistive In performing this type of exercise the patient actively carries the joint through its range of motion while the therapist resists in a slight to marked degree, depending upon the power of the patient s muscle Instead of the therapist s offering this resistance weights (sandbags, Figure 41A and boots Figure 41B with attached disc) may be used and progressively increased as power and endurance are built



A B

FIGURE 41 A Resistive exercises utilizing various weights of sandbags B Resistive exercises utilizing a boot with attached disc weights

The Arthritic Hand The extrinsic and intrinsic musculature of the arthritic hand deserves special attention in the therapeutic exercise program Imbalance in these muscles of the hand usually occurs early and is an important factor in producing deformities The flexors and especially the extensors of the fingers, also must be afforded similar diligent care to prevent deformity and to preserve as much useful function as possible Combinations of active-assistive active and resistive exercises must be used to strengthen the finger and hand musculature

An important and fundamental rule in the therapeutic exercise regime for the arthritic hand is that flexion exercises should always begin distally at the distal interphalangeal joints and that extension exercises should begin proximally at the metacarpophalangeal joints (Figure 42)

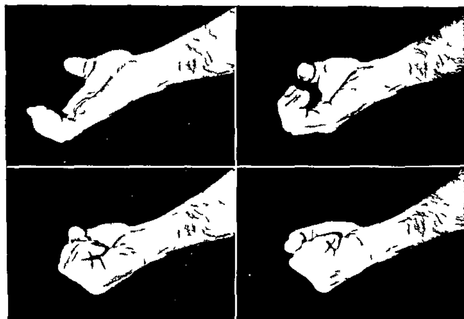


FIGURE 42 Flexion exercises for fingers should always begin at the distal interphalangeal joints

PHYSICAL EXERCISES THE WRIST

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The hand is relaxed and is moved by someone else The movement should not be forced

Instructions to the assistant

☐ *1* Bend patient s hand forward (palm surface toward arm) and back to relaxed position
☐ *2* Bend patient s hand backward (back of hand toward arm) and back to relaxed position
☐ *3* Bend patient s hand sideways (thumb side) and back
☐ *4* Bend patient s hand sideways (little finger side) and back
☐ *5* Exert a gentle pull on patient s hand and gently and slowly rotate the hand in a cranking or circular motion

Active exercises

Instructions to the patient

☐ *1* Close all fingers and thumb to a tight fist then open to full extension
☐ *2* Stand facing a table rest hand palm down on table hold other hand firmly on top of affected hand Raise elbow and forearm of affected arm slowly upward
☐ *3* Turn a door knob (may be given with resistance by someone holding other side of knob)
☐ *4* Shake wrist
☐ *5* Place palms together so that fingers of each hand point toward the wrist of the other partially close each hand and hook the fingers of each hand beneath the fingers of the opposite hand Keeping fingers closed gently pull hands in opposite directions gradually increase pull
☐ *6* Facing wall place palm against wall shoulder high with elbow bent and fingers pointing upward Slide hand downward against wall keeping hand flat on wall and fingers straight
☐ *7* Hold rod turn wrist keeping elbow still
☐ *8* Crawl on all fours (for children)
☒ *9* Place palms together with arms extended in front of chest Bring each forearm (left then right) sharply against chest keeping palms together so that one wrist bends forward and the other bends backward Should be done quickly and vigorously
☐ *10* Wring out assorted sizes of cloths
☐ *11* Place palms together stretch arms in front of chest Draw hands in toward body carrying elbows outward the palms being kept together all the time
☐ *12* Stand near a table place palm of hand down on the table Lean gently on the hand (keeping arm straight) and rock forward supporting yourself lightly with the hand
☐ *13* Place a folded newspaper or a light magazine across hand Do not move the arm and use a wrist motion to flip the newspaper or magazine from the hand

PHYSICAL EXERCISES THE FINGERS

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The patient allows the fingers to remain relaxed while they are moved by some one else

Instructions to the assistant
Bend and straighten the affected fingers gently Do not force movements

Active exercises

☐ 1 Palm flat on table raise and lower fingers one by one
☐ 2 Make an O by touching thumb to finger tips one at a time
☐ 3 Crumple a sheet of newspaper into a small ball with one hand
☐ 4 Squeeze a small rubber ball or sponge
☐ 5 Pick up coins or buttons of assorted sizes
☐ 6 Keep time to music with each finger (drum with extended finger)
☐ 7 Rest hand on table Spread fingers wide and then bring them together
☐ 8 Flip balls of paper with fingers or flip a lightweight book or folded newspaper off extended fingers
☐ 9 Place hands with palms together in front of chest Push against fingers of affected hand with fingers of good hand

PHYSICAL EXERCISES THE ELBOW

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The patient s arm should be relaxed throughout the exercise while an assistant moves the arm slowly and rhythmically The assistant should perform the move ments with gentleness and caution

Instructions to the assistant
Grasp the patient at the middle of the upper arm with one hand the middle of the lower arm with the other Maintain a light steady pull on the lower arm and bend gently at the elbow Reverse the mo tion and straighten the arm

Active exercises

☐ 1 Touch hand to shoulder of the same side and return
☐ 2 Bend forward over a table elbow bent (a) Place palm down on table (b) place palm up on table
☐ 3 Pull up on a bar or a door knob keeping arm straight
☐ 4 Stand facing a wall and extend arms for ward at shoulder height placing hands on wall Bend elbow and push or move to- ward wall without moving hands attempt to touch shoulders to hands
☐ 5 Lift and carry weights Participate in games which involve motion of elbow as
(a) throwing a ball
(b) bean bags
(c) quoits and
(d) sawing wood (for men)

PHYSICAL EXERCISES THE SHOULDER

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The patient allows the shoulder and arm to remain relaxed while someone else moves it about slowly and rhythmically

Instructions to the assistant

In the following exercises grasp the patient s arm just below the elbow with one hand and just above the elbow with the other hand Do not force movements

☐ *1* The patient s arm is in hanging position keep the patient s arm straight and raise it gently forward and upward return to hanging position

☐ 2 The patient s arm is in hanging position keep the patient s arm straight and raise it gently sideways and upward return to hanging position

☐ *3* Bend the patient s arm and place the palm of his hand against the back of his neck Keeping the patient s arm bent gently move the hand and forearm forward and downward continuing the motion to the side of the patient and toward his back Keeping the patient s arm bent reverse the motion to return his hand to the back of his neck

Active exercises

☐ *1* Shrug shoulder in an upward downward and circular motion

☐ *2* Creep up the side of a wall with fingers reaching higher each day

☐ *3* Swing arm forward and upward downward and backward

☐ *4* Place head face down on a table place hands at back of neck Raise both elbows and head from the table Do not raise the body

☐ *5* Raise arm sideward and upward clapping hands above head Repeat the same exercise bringing the backs of hands together

☐ *6* Place hands alternately behind neck and lower back keeping elbows bowed (to rotate shoulders)

☐ *7* Sitting arms folded and elbows kept shoulder high unfold arms bringing elbows sharply back Keep elbows shoulder high at all times

☐ *8* Raise arm sideward shoulder high circle arm starting with small circles and gradually increasing the size of the circles

☐ *9* Standing arms hanging wrists crossed in front of body move arms upward and backward overhead then return

PHYSICAL EXERCISES THE ANKLE

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Active exercises

- ☐ *1* Bend foot up and down slowly
- ☐ *2* Turn foot in and out slowly
- ☐ *3* Sitting rotate the foot in a cranking or circular motion
- ☐ *4* Stand with feet parallel about 4 inches apart Rise on toes and swing heels outward Return to standing position
- ☐ *5* Put a bandage or strap (about 2 yards long) across bottom of fore part of foot and hold both ends with your hand Pull up on the bandage then resist and push foot down curling toes downward
- ☐ *6* Sitting bend the affected knee and grasp fore part of foot with hand on opposite side Place hand of same side on knee push down on knee and pull up on foot straightening leg in air
- ☐ *7* Sit in chair cross lower part of legs so that feet are resting on outer borders In this position bend the toes and feet away from each other
- ☐ *8* Sit in an armchair and assume the same position as in exercise *No 7* Grasp arms of chair and rise supporting most of the weight on the hands increase height of rise and reduce weight on hands rock from side to side on outer borders of feet
- ☐ *9* With toes turned in walk on tiptoes crossing feet at each step
- ☐ *10* Stand facing a wall a little more than an arm s length away lean forward and rest hands on wall Keep knees straight heels flat on ground and rock forward
- ☐ *11* Hold on to some support and stand with fore part of one foot on the edge of a step or stool so that heel is off the edge Lower and raise body supporting some weight with foot on stool On subsequent days increase amount of weight supported by foot on stool

PHYSICAL EXERCISES THE KNEE

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The patient allows the leg to remain relaxed while someone else moves it slowly and rhythmically

Instructions to the assistant

Grasp the patient s leg at the thigh with one hand and below the knee with the other Bend and straighten the leg at the knee slowly and rhythmically without force

Active exercises

- ☐ *1* Sitting or lying on back with knee bent tighten muscles of entire leg and straighten the knee
- ☐ *2* Sitting on floor keeping leg straight lift knee off floor
- ☐ *3* Sitting gradually bend leg over edge of table and exercise by bending and straightening the knee (Sandbags of gradually increasing weight should be hung over the ankle as the leg strengthens)
- ☐ *4* Sitting body erect legs extended with knees straight reach forward and touch toes
- ☐ *5* Lying on abdomen bend affected knee Make a complete turn of a sheet around ankle then grasp both ends of sheet and attempt to flex knee by pulling on sheet
- ☐ *6* Lie on back and lift legs in air Move legs as though pedaling a bicycle have someone grasp feet to give assistance On succeeding days have the assistant lightly resist the pedaling to increase bending of leg
- ☐ *7* Sit on floor and hold a broomstick with both hands place feet on broomstick between the hands keeping heels on floor Resisting lightly with legs pull stick toward body so that knees bend
- ☐ *8* On hands and knees rock backward toward heels then forward
- ☐ *9* Kneeling on sound knee other foot flat on floor bend forward over the front knee gently forcing affected knee into flexion
- ☐ *10* Stand with back to the front of a chair rest toe of affected leg on seat of chair with heel against the back of chair Bend body backward and downward bending knee

PHYSICAL EXERCISES THE SPINE AND CHEST

Special Instructions Perform the exercises which I have checked below ______________ each day

Active exercises

☐ *1* Lie down on back

1 Clasp both hands under the head
(a) pull the flexed elbows firmly back on the bed while inhaling deeply
(b) hold this position for a count of 5 to 10
(c) exhale and relax
(d) repeat 5 to 20 times

2 Place a rolled towel or small pillow under upper part of the back between the shoulder blades (with no pillow under the head)
(a) inhale slowly and raise arms upward and backward overhead
(b) exhale and lower arms to sides
(c) repeat 5 to 20 times

☐ *2* Lie down on abdomen

Stretch arms outward at the sides to shoulder level
(a) raise head chest shoulders and arms off the bed
(b) relax
(c) repeat 10 to 20 times

☐ *3* Sit down

Place hands at base of skull fingers touching
(a) inhale and pull flexed elbows backward and raise chest
(b) exhale and relax
(c) repeat 5 to 20 times

☐ *4* Stand up

1 Stand facing the corner of a room at arm s length from walls Place one hand on each wall the width of shoulders apart at the shoulder level Bend elbows slightly and hold abdomen in
(a) slowly let the weight of the body go forward forcing the chest toward the corner
(b) return to original position
(c) repeat 5 to 20 times

2 Suspend the body without bending elbows by grasping an overhanging bar with hands width of shoulders apart Except for hands remain as relaxed as possible for a count of 5 to 10 Rest and then repeat 5 to 10 times

Treatment should be continued conscientiously for as long as necessary to obtain the most favorable outcome

PHYSICAL EXERCISES THE HIP

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The patient allows the hip and leg to remain relaxed while someone else moves the leg about slowly and rhythmically

Instructions to the assistant

Grasp the leg above and below the knee when performing the following movements Do not force movements

☐ *1* Have the patient lie on his back Grasp the lower leg at the calf with one hand the thigh with the other Bend the leg at the knee and gently push the thigh toward the chest Return to starting position

☐ 2 Have the patient lie on his side (side opposite to the leg to be exercised) Move the affected leg backward (keeping knee straight) then return it to starting position

☐ *3* Have the patient lie on his back Move the leg out to the side (keeping knees straight and toes pointed up) then return it to starting position

☐ *4* Have the patient sit with legs dangling over side of bed Instruct the patient to hold knee of leg to be exercised so that it does not move *Hold the leg at the calf* and gently swing the lower leg sideways so that it crosses the other leg then return it to dangling position

☐ *5* Have the patient assume the same position as in exercise *No 4* Hold the leg at the calf gently swing the leg sideways away from the other leg and then return it to dangling position

Active exercises

☐ *1* Lie on back Raise and lower leg slowly
(a) with knee straight
(b) with knee bent

☐ *2* Lie on back With legs straight
(a) slide legs wide apart to the side
(b) return

☐ *3* Lie on back With knee bent and clasped with both arms
(a) force knee against chest
(b) push knee away from chest

☐ *4* Lie on back With legs flat on bed stretch first one leg then the other downward then shrug each hip upward (hip shrugging)

☐ *5* Sit on a high table or bench letting leg to be exercised dangle over the side Swing the affected leg back and forth from the hip

☐ *6* Sit on bed with legs straight out and attempt to touch toes with hands by bending forward

☐ *7* Lie on face and lift leg backward keeping knee straight

☐ *8* Lie on side and make a scissors motion with legs as in swimming

☐ *9* Stand between two chairs grasping backs for support Swing affected leg back and forth

☐ *10* Stand with feet about 12 inches apart Turn foot and leg on side affected inward and outward

☐ *11* Stand keeping the knee straight Raise affected leg and place heel on (a) stool (b) chair (Gradually increase the height of object on which heel is placed)

☐ *12* Walk up and down steps

☐ *13* Stand then lunge forward on good leg as in fencing Repeat lunging sideward

☐ *14* Ride a stationary bicycle or lie on back raising legs in the air and do bicycling exercise

SPECIAL INSTRUCTIONS FOR PATIENTS WITH RHEUMATOID SPONDYLITIS

The *objectives of physical therapy* for rheumatoid spondylitis are

1 To obtain or maintain as nearly normal a *position* of the spinal column as possible

2 To strengthen the spinal muscles and increase the breathing capacity

3 To relieve symptoms

Rheumatoid spondylitis is a form of arthritis in which the joints of the spinal column become inflamed The cause of the condition is not known The disease may be expected to produce symptoms of varying intensity from time to time while it is in active or progressive phase When it is no longer active or progressive the posture or alignment of the spinal column (good or bad) which you will have will be the result of what has occurred during the active stages of the disease

Postural training is of utmost importance because the disease tends to produce forward bending and rounding of the upper part of the back Permanent fixation in such a position may result Therefore you should be posture conscious and try to maintain good posture at all times (standing sitting and lying) Forced deep breathing exercises may help to prevent flattening of the chest and particularly forward bowing of the upper part of the spinal column You should attempt to increase the circumference of the chest about 1½ to 3 inches on deep inhalation

Measure your height every month This will enable you to know whether you are maintaining your height or increasing it By measuring your height you will be able to detect early any tendency toward forward bending with consequent shortening in height

Patients with rheumatoid spondylitis need *more than* the normal amount of rest in bed to avoid muscular and nervous fatigue and a consequent increase in symptoms In most instances *ten hours or more of rest in bed should be obtained in each 24 hours* When you cannot obtain this much rest *during the night you should plan to* get extra hours of rest during the day Even though you may feel better with shorter hours of rest it is not to be anticipated that the disease can be controlled for a long period of time unless you get extra hours of rest

During the hours of resting you should *lie flat on your back* without using any pillows under the head If owing to the forward curvature of the spinal column it is impossible for you to lie flat on your back without a pillow under your head you may use a pillow of the smallest size and you should attempt to discontinue its use gradually as improvement occurs

A board should be placed under the mattress to prevent sagging of the bed and to obtain a firm support for the spinal muscles and joints If you wish you may use a small soft pillow or towel under the small of your back while lying in bed If some forward stooping has occurred I may direct that you lie on your back using a small pillow or a rolled towel between the shoulder blades during at least a part of the hours of rest

Certain forms of physical activity should be avoided by patients who have rheumatoid spondylitis The activities most undesirable are those involving bending twisting heavy lifting and standing for long periods

All physical activities should be carried on in moderation or omitted entirely if they interfere with adequate hours of rest or if they aggravate the condition

PHYSICAL EXERCISES THE HIP

Special Instructions Perform the exercises checked below At the beginning, do each exercise five times, morning and evening

Passive exercises

The patient allows the hip and leg to remain relaxed while someone else moves the leg about slowly and rhythmically

Instructions to the assistant

Grasp the leg above and below the knee when performing the following movements Do not force movements

☐ *1* Have the patient lie on his back Grasp the lower leg at the calf with one hand the thigh with the other Bend the leg at the knee and gently push the thigh toward the chest Return to starting position

☐ 2 Have the patient lie on his side (side opposite to the leg to be exercised) Move the affected leg backward (keeping knee straight) then return it to starting position

☐ *3* Have the patient lie on his back Move the leg out to the side (keeping knees straight and toes pointed up) then return it to starting position

☐ *4* Have the patient sit with legs dangling over side of bed Instruct the patient to hold knee of leg to be exercised so that it does not move *Hold the leg at the calf* and gently swing the lower leg sideways so that it crosses the other leg then return it to dangling position

☐ *5* Have the patient assume the same position as in exercise *No 4* Hold the leg at the calf gently swing the leg sideways away from the other leg and then return it to dangling position

Active exercises

☐ *1* Lie on back Raise and lower leg slowly
(a) with knee straight
(b) with knee bent

☐ *2* Lie on back With legs straight
(a) slide legs wide apart to the side
(b) return

☐ *3* Lie on back With knee bent and clasped with both arms
(a) force knee against chest
(b) push knee away from chest

☐ *4* Lie on back With legs flat on bed stretch first one leg then the other downward then shrug each hip upward (hip shrugging)

☐ *5* Sit on a high table or bench letting leg to be exercised dangle over the side Swing the affected leg back and forth from the hip

☐ *6* Sit on bed with legs straight out and attempt *to touch toes with hands by bending forward*

☐ *7* Lie on face and lift leg backward keeping knee straight

☐ *8* Lie on side and make a scissors motion with legs as in swimming

☐ *9* Stand between two chairs grasping backs for support Swing affected leg back and forth

☐ *10* Stand with feet about 12 inches apart Turn foot and leg on side affected inward and outward

☐ *11* Stand keeping the knee straight Raise affected leg and place heel on (a) stool (b) chair (Gradually increase the height of object on which heel is placed)

☐ *12* Walk up and down steps

☐ *13* Stand then lunge forward on good leg as in fencing Repeat lunging sideward

☐ *14* Ride a stationary bicycle or lie on back raising legs in the air and do bicycling exercise

used by the patient With a heating pad, the patient is able to lie in a comfortable position and to move it from one area of the body to another without expending much energy, but the therapeutic effectiveness of the heat from it is far less than that from the other sources mentioned The specific source of heat to be recommended should be dictated by simplicity, economy and the extent of body area requiring treatment It must be emphasized that the therapeutic effect of heat is solely one of analgesia and that physiotherapeutic modalities in no way cure or deter the basic pathological process of the arthritis

The hot tub bath although a very helpful means of general heating in arthritis should be used with caution Not only is it important that the patient be instructed in the use of safety devices such as nonskid rubber mats and safety bars on the tub, but he must be cautioned specifically as to the dangers of prolonged or excessive heating in a hot tub bath The temperature of the water should not exceed 99° F and the patient should remain immersed no longer than 30 minutes Baths which are hotter or of longer duration may produce an elevation of body temperature although at times indicated, they must be medically supervised because of the danger of aggravating the disease process

If contrast baths are to be used for hands or feet (Figure 43A), the most effective routine is to begin with immersion of the parts to be treated for 10 minutes in the hot water (usually 110 degrees) This initial long warming period is followed by immersion in the container of cold water (usually 65 degrees) for 1 minute followed by immersion in the hot water for 4 minutes Thereafter the parts are immersed alternately in the cold water for 1 minute and in the hot for 4 minutes for an overall total of 24 minutes ending with the hot

In suggesting home paraffin bath treatments for hands and wrists (Figure 43B) it is wise to know (1) if strength in the hands and arm muscles is sufficient for the patient to carry out the procedure alone (2) if not sufficient, whether the patient has someone to assist him and (3) whether the patient is of such temperament that he will ask for help if he needs it If the patient s hands and arms are not strong enough to lift the double boiler containing the paraffin there is real danger that it may spill and inflict severe burns Verbal instructions in the technique of using paraffin baths at home are usually inadequate the prospect of immersing a hand in hot paraffin in itself, is frightening to the patient and he should experience a treatment under supervision before being expected to carry it on himself A heater with a double boiler containing paraffin therefore must be set up either at the clinic or in the home so

7

Home Programs of Physical Therapy

LILLIAN SHOTTER

For many reasons economic and other outpatient physical therapy departments of hospitals cannot undertake treatment programs of indefinite duration for arthritic patients Rather patients should be treated for limited periods of time during which they are instructed in home programs of physical therapy, following this active treatment should be terminated and the home programs continued

In developing a home program of therapy the two major considerations are heat and therapeutic exercise The therapist in working with the arthritic patient either in the physical therapy department or in the arthritis clinic must determine the type of heat applicable and available for use in the home must make sure that the patient knows how to administer it and must outline and review the patient s exercises to be certain that these are being done correctly Where possible a member of the family should be instructed to assist the patient in carrying out these procedures If in addition it is also possible for the therapist to make a home visit and to evaluate the home situation many potential problems can be averted safely devices may be set up and a member of the family may then be shown how to assist in the safe application of specific forms of heat whether radiant heat luminous heat, moist hot packs hot baths, full wet body packs paraffin baths or contrast baths (Figure 43)

HEAT

In selecting heat for home use it is preferable to use sources such as a radiant heat lamp a moist hot pack or a hot tub bath rather than a heating pad, although a pad is usually more available and more frequently

that the patient may go through the entire procedure of giving himself a treatment

Ordinary fruit jar paraffin is purchased from the grocery or hardware store Four to six quarter pound cakes are placed in the top of the double boiler To this is added a small amount of mineral oil to reduce the drying effect of the paraffin and its tendency to adhere to hair on the skin After the paraffin has melted it is removed from the fire and allowed to cool When a film of wax begins to form on the surface the paraffin is ready for use It is best to test the temperature with a quick dip of one finger If the heat is tolerable the hand is immersed and removed quickly The paraffin film on the hand immediately hardens upon contact with the air and the hand is then ready for a second quick dip This is repeated for 4 to 6 dips thus encasing the hand in a thick glove of warm wax A sheet of wax paper and a towel are then wrapped about the hand to retain the heat After 20 to 30 minutes the gauntlet of wax is peeled off and returned to the double boiler to be reused subsequently and the warm hand is ready for exercise Even with a demonstration treatment at the clinic or in the home it is usually best also to give the patient written instructions Some patients prefer to carry out their home paraffin baths in the evening before going to sleep, those who use their hands in their occupations may perform them before going to work each day

Hot packs provide a good cheap source of heat These may be woolen strips A more convenient pack which requires no wringing is the commercial Hydrocollator pack (Figure 43C) This consists of compartments of silica gel which eliminates drip and retains effective heat for a 30 minute application It is applied with six layers of toweling between the pack and the skin to prevent burning Special towel bags may also be purchased for this purpose Various sizes of these packs are available, the size to use depending upon the size of the area to be heated Following use the pack is hung to dry until needed again

Heat lamps (Figure 43D) and bakers (Figure 43E) infrared or radiant are familiar items and widely available The type and size of the apparatus indicated for the individual patient depend upon the extent of joint involvement requiring treatment In general heat lamps are applied 30 inches away from the part being treated for 20 to 30 minutes at a time Patients must be cautioned that these are *not* sun lamps which also are available for other purposes in drug and department stores

Diathermy ultrasonic microtherm and other complex apparati for heating are not safe for general use in the home and should not be prescribed for that purpose

A



B



C



D



E



FIGURE 43 Good sources of heat for a home physical therapy program

the average rheumatoid arthritic has a low capacity for physical activity If too many exercises are given to him at once, he will become discouraged and end up doing none of them Therefore in a patient with multiple joint involvement it is best to start with those exercises that will keep him as independent as possible The exercise program then assumes greater significance to the patient and is more likely to be accepted and carried out The patient living alone, for example, who has knee and shoulder involvement will be helped most by having his knees strengthened first so that he can better get about and take care of his needs He thus begins with lower extremity exercises At the same time the therapist reviews the patient s daily living routine and points out ways in which he can avoid unnecessary work for the damaged knee joints Casters may be applied to a straight chair which can be used to glide from one room to another A high stool from which to wash dishes may be used by the housewife in the kitchen A supportive device may be attached to the tub to facilitate getting to and from the hot bath in which the patient soaks and stretches the knees As the patient assimilates these exercises and techniques into his daily life, exercises for the upper extremities may be added to his home program

For the patient confined to a wheelchair or to bed, upper extremity exercises are started first These exercises should be synchronized with activities of daily living or with an activity of daily living training program Since strength is needed in the hands arms and shoulders to transfer to and from the wheelchair, as from bed or to a toilet, emphasis in exercise is placed on these parts of the body while efforts are being made to train the patient in performance of transfer activities Meanwhile at the start, the only work being done on lower extremities may be quadriceps and gluteal setting and stretching and range of motion maneuvers for the prevention of contractures

For patients who are not employed, it is usually suggested that exercises be done six times a day, in this way, they may be spaced so that they are performed in doses which are tolerable and with sufficient rest periods between For patients who are able to work it is suggested that the exercise program be carried out twice a day once on arising and again in the evening The main precaution in a home exercise program is avoidance of pain and fatigue which persists until the following day, if this occurs the program of exercise must be revised and cut down

Massage is rarely a practical procedure for home use Since a patient cannot adequately massage himself, he must depend upon another member of the family if it is to be done Not only is it difficult to train an unskilled person in adequate massage but massage is passive therapy which too frequently diverts the patient s attention from his active exercise program which is the important and vital procedure that he must diligently carry on daily at home so long as his arthritis is active For these reasons massage is rarely included today in home programs

EXERCISE

Exercise is the main ingredient of a home program, and the use of various types of heat simply provides the analgesia which makes it possible for the patient to carry out his exercise program in maximum comfort (see Chapter 6) The usual procedure is for the patient to apply heat locally to the part or parts involved at least once daily for 30 minutes, following which a prescribed exercise program is carried out The exercise program for each patient must be individually tailored, depending upon the specific joints involved by the arthritis and upon the extent of involvement Even in the cases of bedridden and acutely ill patients passive exercises are extremely important These patients are mostly hospitalized and usually require treatment by professional physical therapists For the clinic patient however whether ambulatory or in a wheelchair, the exercise program is an active one Even if the patient is unable to exercise his joints actively through their complete ranges of motion, he must exercise them actively if he is to increase muscle power and to increase the joint ranges of motion

The purposes of an active exercise program for the arthritic are to maintain ranges of motion within normal limits in the involved joints and to aid in increasing the power of the muscles around these joints Such a program usually can be carried out by the patient at home if he is told what to do and shown how it can be accomplished in his home environment When the physical therapist prepares an active home exercise program for a patient it should be as simple to understand as possible and should be presented to the patient movement by movement When instructing him in this program the therapist should limit the number of exercises at each session to three and the method of presentation should include demonstration of (1) starting position (2) movement to farthest point (3) return to starting position and (4) *rest*

In planning an exercise program it is important to keep in mind that

flexors dorsiflexors of the wrist and shoulder girdle depressors and internal rotators All of these muscles and the joints that they control must be evaluated before a program begins A muscle test is done to explore the extent and locations of muscle weakness and ranges of motion are measured to determine the joint limitations that may with muscle weakness cause difficulty in the rehabilitation process In addition the patient should be observed constantly for pain so that proper precautions may be taken to prevent undue stress on arthritic joints

EXERCISE PROGRAM

The exercise program for the arthritic patient is based upon

(1) Limitations in joint ranges of motion
(2) Extent of muscle weakness
(3) Location of muscle weakness
(4) Degree of joint inflammation and of pain

A basic prerequisite to an effective muscle strengthening program is adequacy in ranges of motion of the joint Muscles can be exercised through their full excursions and with optimum results only if the joints being mechanized have free ranges of motion The usual prescription therefore for the arthritic patient will include range of motion as well as strengthening exercises

PROPER SELECTION AND CORRECT MEASUREMENT OF A WALKING DEVICE

Crutches Wooden crutches with double uprights and hand piece and made of lightweight wood (Figure 44A) are standard equipment The most important consideration especially for the arthritic patient in the selection of a crutch is that it be adjustable in total length and in the height of the hand piece

The aluminum axillary crutch with double uprights and hand piece (Figure 44B) is adjustable in total length and in the hand piece It is often preferred by the arthritic patient because of its lighter weight

Lofstrand crutches (Figure 44C) are of tubular aluminum and are adjustable in total length and in the length of the forearm piece Good features of this crutch for the arthritic are the rubber-covered armrest and the rubber covered hand grip The forearm piece adjustable and soft affords added stability for the forearm that many arthritics need

The tubular aluminum axillary crutch with its adjustable and swivel

8

Gait Training and the Prescription of Crutches

JACK HOFKOSH

In the prescription of suitable crutches and the proper gait for the arthritic patient with involvement of lower extremities consideration must extend to all weight bearing joints It is desirable that the hips, the knees and the ankles be freed of as much stress as possible during the stance phase of ambulation Depending upon the extent to which these are involved the upper extremity joints should also share in weight-bearing When upper extremity joints however are also involved careful attention must similarly be paid to the weight bearing being assumed by the shoulders elbow wrists and fingers The selection measurement and fitting of crutches for the arthritic patient must therefore be modified according to individual needs Alteration in the standard gait pattern or the addition of an assistive device to the crutch often may be necessary In training the arthritic patient in ambulation correct postural habits are essential prerequisites to good gait this is important in sitting posture as well as in standing

The four steps that govern a gait training program for the arthritic are (1) evaluation of the patient s muscle joint and pain status, (2) an exercise program to develop optimum range of motion strength and coordination to accomplish crutch management (3) proper selection and correct measurement of a walking aid and (4) determination of the gait pattern best suited to meet the patient s individual needs

EVALUATION OF THE PATIENTS MUSCLE, JOINT, AND PAIN STATUS

Five main muscle groups participate in the use of crutches in walking the flexors of the arms extensors of the forearm finger and thumb

hand piece of the crutch should then be adjusted so that the patient's elbow is at a twenty to thirty degree angle with the wrist in extension

Canes The degree and type of deformity of the hands should be taken into consideration in fitting a cane The conventional cane with its C curve handle (Figure 45A) is a light but strong cane which is usually preferred by the arthritic patient

For some patients the conventional cane with a T handle (Figure 45B) provides a hand piece which is easier to grip than the C-curve hand piece

The aluminum cane (Figure 45C) is lightweight and sturdy although more expensive It has the added advantage of being adjustable in length

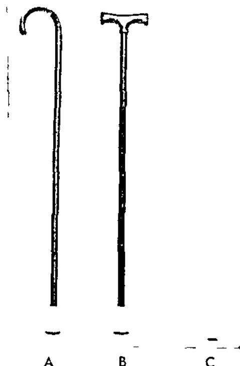


FIGURE 45 A Conventional with C curve handle B Conventional with T handle C Lightweight aluminum with C curve handle and adjustable in length

Crutch and Cane Adaptations The triceps support (Figure 46A) in the form of a metal cuff may be used to assist in stabilizing the elbow in extension it may be adapted to fit any underarm crutch This attaches on the upright as a half circle of padded aluminum and extends out and around to support the upper arm behind the triceps about halfway up the humerus

The bent-arm support (Figure 46B) extends out from both uprights so that the elbow rests comfortably in a padded cradle as the hand grasps the attached dowel or hand piece

hand piece (Figure 44D) provides the special feature of a hand piece which is adjustable in both the horizontal and vertical planes It is useful where supination or pronation is limited and painful

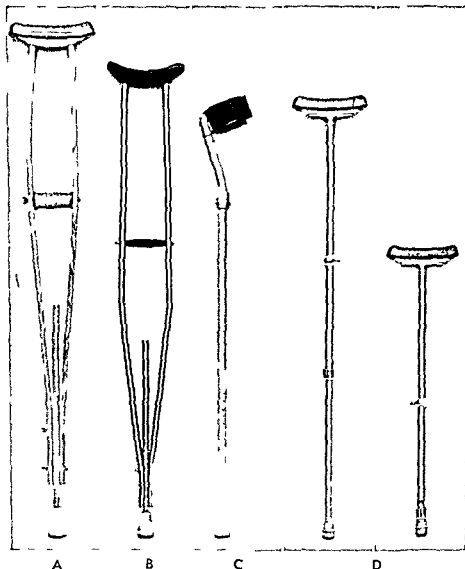


FIGURE 44 A Wooden axillary crutch with double uprights and hand piece B Aluminum lightweight crutch with double uprights and hand piece C Lofstrand crutch D Tubular aluminum axillary crutch adjustable and with swivel (360) hand piece

In determining the proper length of a crutch, the patient should be measured from the anterior fold of the axilla to a point 6 inches out from the side of his foot or the distance from the anterior fold of the axilla to the bottom of the foot may be determined and 2 inches added The

hand piece of the crutch should then be adjusted so that the patient's elbow is at a twenty to thirty degree angle with the wrist in extension

Canes The degree and type of deformity of the hands should be taken into consideration in fitting a cane. The conventional cane with its C-curve handle (Figure 45A) is a light but strong cane which is usually preferred by the arthritic patient

For some patients, the conventional cane with a T handle (Figure 45B) provides a hand piece which is easier to grip than the C curve hand piece

The aluminum cane (Figure 45C) is lightweight and sturdy although more expensive. It has the added advantage of being adjustable in length

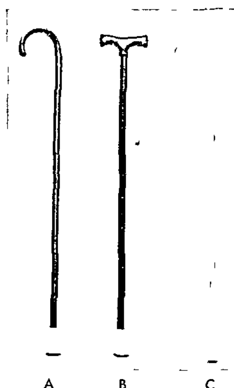


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The bent arm support (Figure 46B) extends out from both uprights so that the elbow rests comfortably in a padded cradle as the hand grasps the attached dowel or hand piece

A B

FIGURE 46 Modifications adaptable for crutches A Improvised triceps support B Arm support

The hand piece of the crutch or cane may have to be especially adapted to individual hand deformities In cases where a standard hand piece (Figure 47A) is inadequate special molds may need to be made

Crutch or cane tips should be large in circumference and have good suction A 2-inch or 3 inch height with a diameter of 1½ to 1¾ inches in soft rubber has been found most satisfactory (Figure 47B)

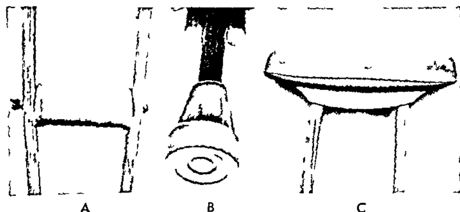


FIGURE 47 A Hand piece (standard) B Crutch tip #400 C Axillary rest

Axillary crutch supports should be covered with sponge rubber protective pads (Figure 47C)

DETERMINATION OF THE GAIT PATTERN BEST SUITED TO THE PATIENT

In deciding the specific gait pattern for a patient the following factors must be evaluated

Step ability Can the patient take steps with either one or both lower extremities?

Weight bearing and balance ability of the lower extremities Can the patient bear weight on either one or both lower extremities?

Weight bearing and balance ability of the upper extremities Can the patient push his body from the floor by pressing down on his crutches?

Direct body maintenance ability Can the patient maintain his body erect?

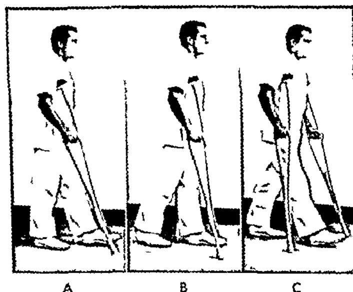


FIGURE 48 Two Point Gait The right crutch is advanced with the left foot as weight is borne on the left crutch and right foot (A) As weight shifts from the latter (B) the opposite is performed (C)

There are seven standard crutch gaits (1) alternate drag to (2) simultaneous drag to (3) swing to and (4) swing-through (in these four gaits the full body weight is placed on the crutches and the upper extremities during a part of the swing phase) (5) the two point (Figure 48) (6) three point and (7) four point gaits In the last three of these gait patterns the crutches assist in the swing and weight-bearing phase of one lower extremity and weight bearing is distributed between the upper and lower extremities

The crutch gait for the arthritic patient will differ according to the part or parts of the body involved Most patients, because of upper extremity involvement in addition to involvement of the lower extremities, are not able to put their total weight on their hands and must be taught a two three or four point gait In these gaits the crutch bears part of the weight load of the body and no one joint or group of joints is called on to bear full body weight during either the swing or stance phase of walking

If possible, two gaits should be taught one for speed and one for safety so that the patient can shift from one to the other as the need arises This may not always be possible when extensive disseminated joint damage is present For the spondylitis patient however with bilateral hip involvement it is feasible to teach a two point gait for general use and a swing through gait for speed

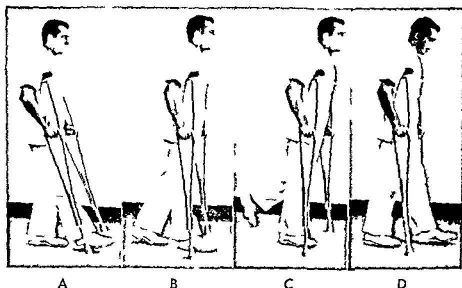


FIGURE 49 Three Point Gait (A) Both crutches advance with the involved leg providing (B) three points of weight bearing support as (C and D) the uninvolved extremity is advanced

In cases of unilateral hip or knee involvement two crutches may be used with a three point gait (Figure 49) The two crutches are brought forward for support at the same time that weight is shifted to the involved lower extremity thus providing three points for simultaneously sharing the weight If only one crutch or one cane is needed the patient should be trained to use it with the arm opposite to the side of joint involvement weight is thus shared by the opposite upper extremity at the same time that it is borne on the involved lower extremity

9

Activities of Daily Living Testing and Training

EDITH BUCHWALD LAWTON

A program concerned with activities of daily living constitutes an integral part of total rehabilitation. The purpose of such a program is to train the patient to be able to perform within his particular limits his maximum daily activities in connection with his home, his work, and his social life.

The details and various methods involved in teaching and testing daily activities are not described here, but the basic principles underlying the teaching and testing of such activities are outlined. These basic principles are essential for all patients regardless of their disability, and the same principles apply to the arthritic patient. The methods, however, in performing any activity have to be worked out in accord with the specific physical problems of the patient.

DEFINITION

Activities of daily living comprise all activities entailed in human relationships. This chapter, however, is concerned with daily activities of the physically handicapped patient necessary to physical independence. In contrast to vocational rehabilitation, which deals with problems of job fitness and with activities inherent in an actual job, the activities discussed here are those basic activities necessary during an ordinary day; these are termed Activities of Daily Living (A.D.L.).

To write down all the things done from the moment of waking in the morning until bedtime at night would produce a list of literally hundreds of activities. No matter what part of the world one thinks of, or how different the customs of peoples, there are certain common basic essential

activities in every person's day getting out of bed, getting dressed washing eating and reaching places of occupation These in general are activities which are performed easily and without much thought For a patient however with involvement of one or more extremities they often become equivalent to strenuous athletic achievements and have to be practiced like any other physical skill

The teaching of A D L requires first careful analysis of the motions inherent in a given activity—for example putting on shoes These component motions then must be practiced as individual exercises bending to reach the toes grasping moving in the sitting position etc Fortunately all A D L have certain fundamental motions in common those *involved in changing position, sitting balance moving in the sitting position* reaching grasping standing and walking

As long as any of these motions are practiced as isolated motions they remain exercises and as such constitute most of the therapeutic exercise program in physical therapy When they are carried out in a real life situation however and are combined to perform a functional activity such as actually putting on shoes, they can be considered as training in a daily activity

Aside from the combination of motions many other important aspects of the activity need to be considered How does the patient get the shoes? Does somebody have to bring them to him or can he get out of bed and take them out of the closet himself? Is the bed too high or too low for him to transfer to his wheelchair or to stand up? Does the wheelchair need adjustments to facilitate the transfer? Can the patient wheel his wheelchair to the closet? Can he walk although there is a carpet on the floor or would it be safer to remove the carpet? Finally can he reach the shoes? A daily activity obviously means more than just adding one motion to another and even involves consideration of necessary furniture equipment and possible adaptations

In a certain sense A D L may be considered not as a treatment but rather as the practical application of all treatments to a life situation For *instance the patient learns in physical therapy how to perform* push ups but this becomes meaningful only if he uses his skill to transfer from bed to wheelchair from wheelchair to toilet etc Gait training in the gym is of value only if the patient actually uses this gait when he walks from one room to the other when he crosses the street etc The best eating device is only a piece of material unless it is used at every meal

The ability to cope with daily necessities does not come spontaneously, nor is it a skill that is picked up naturally as the patient goes

along A program to achieve it must be carefully planned, taught and practiced according to the physician s prescription

It cannot be overemphasized that the mere performance of motions is not the same as carrying out an activity To test the patient and train him to become efficient in daily activities one must provide the furniture and equipment used in daily life While it is desirable to train a patient to adjust to different environments (rooms layout furniture etc) it must be realized that adaptations in his surroundings may prove extremely helpful in terms of conserving his energy output The whole trend in modern householding is of course in this direction When a patient cannot be trained to function unaided many of these adaptations will make it easier for the person who has to assist him

Activities of Daily Living are divided into the following groups

I Bed Activities
(1) Changing position from back to prone to sitting
(2) Maintaining sitting balance while moving trunk and/or arms
(3) Moving in all directions while sitting

II Wheelchair Activities These include all the motions necessary to handle the wheelchair as in
(1) Transferring from wheelchair to bed to car to toilet etc
(2) Propelling the wheelchair

III Self Care Activities These include
(1) Toilet activities
(2) Eating activities
(3) Dressing activities

A patient will carry out these self care activities either in bed or in the wheelchair depending on his efficiency in bed or in wheelchair activities Some self care activities may be carried out standing and/or walking

IV Ambulation and Elevation Activities With or without crutches canes braces or prostheses
(1) Ambulation activities
(*a*) Inside the house on different floor coverings such as linoleum wood etc
(*b*) Outside the house on different ground such as cement gravel etc
(2) Elevation activities
(*a*) Standing up and sitting down from wheelchair bed toilet car etc

(*b*) Climbing activities stairs curbs, crossing street Ambulation activities and learning how to walk are not the same The actual walking pattern is taught in the gymnasium as part of physical therapy whereas ambulation activities are the practical application of already acquired walking patterns It would be rather absurd to take the patient for a walk and ask him to cross the street unless he had already learned how to walk Unless a patient can come to a standing as well as a sitting position easily and without help, he is not a functional walker

V Traveling Activities With or without use of wheelchair With or without use of crutches, canes, braces, prostheses (special hand controls)

(1) Use of private car including use of garage and, in case of a wheelchair patient, wheelchair in and out of car

(2) Use of public transportation taxi bus etc

VI Miscellaneous Hand Activities (Figure 50) The use of the hands is inherent in all activities The term *hand activities* as used here indicates activities involving almost exclusively the use of the hands such as

(1) Using the telephone, signal buttons etc

(2) Handling of drawers, faucets keys etc



FIGURE 50 Testing of patient in performance of hand activities

STANDARD OF PERFORMANCE

Once it is determined which activities comprise an A D L program, the standard of performance must be defined It is not enough to say, A patient needs a great deal of help or He just needs a little bit of help, He is quite dependent He is independent It is of utmost

importance to define clearly what degree of independence a patient has reached and the amount of help needed

I When does a patient need help?

(1) If he cannot perform any part of a given activity

(2) If he can only perform part of a given activity and/or if his balance is so inadequate that he will need support to be protected from falling

II What kind of help is necessary?

(1) If the activity involves gross body motions and consists in transfer of the entire body weight from one place to another as for example in transfer from bed to wheelchair and the patient cannot perform any part of this activity then some body has to *lift* him

(2) If the activity consists of small motions as in eating combing one s hair brushing one s teeth etc and the patient cannot perform any part of these then somebody has to do the entire activity for him—namely feed him comb his hair brush his teeth etc

(3) If the patient can perform only part of a given activity then the help will consist of

(*a*) Initiating filling in or completing the activity for him For example the patient can feed himself after somebody has cut the meat for him the patient can get from his wheel chair into a car but somebody must place the wheelchair in the car

(*b*) Support, if balance is inadequate for example the patient can come to a standing position but somebody has to stand by to steady him

This kind of help in contrast to lifting may be designated as *assistance* and on this basis it can be determined what kind of attendant care is needed

III What do we mean by independence?

(1) The patient needs no help whatsoever can carry out a given activity entirely by himself without anyone around and with the necessary endurance and speed

(2) He can also repeat the activity as often as may be necessary during the day without becoming exhausted

THE USE OF DEVICES

Some patients may need devices to assist in the performance of certain activities Whether permanent or temporary these devices should be simple and easy to handle The problem of independence applies to them in the same way as stated above in regard to any activity and it must be noted whether the patient can handle the devices independently or with help

TESTING METHOD

In order to objectively measure a patient s progress an accurate recording must be made of what could be done at the start and what could be done at discharge Test forms usually are so designed that the initial test and progress can be recorded on the same sheet Progress should be recorded as soon as each new activity is learned Deficiencies as apparent on the initial test thus constitute the basis for the particular A D L training program

How to Test

The patient is told to sit up or show how you brush your teeth or comb your hair etc When testing the patient it is important not to direct or use teaching techniques It is of interest to find out how the patient performs a given activity and with what tricks of ingenuity

Since these are activities of daily living it is essential that the patient be tested (as well as taught) in an actual life situation If he is to show how he can wash his hands he must be provided with the sink water soap and towel The same applies to feeding or any other activity performance of motions is not the same as carrying out the activity A patient may ascend and descend stairs very well in the therapeutic gym but to go out dressed for the street especially wearing heavy winter clothing and to descend the steps that lead down from the entrance door is quite a different matter unless one tests in such an actual situation the picture may not be a true picture

ROLE OF A D L IN A TOTAL REHABILITATION PROGRAM AND USE OF THE A D L TEST

Since A D L is only one aspect of the total rehabilitation program the test should be so designed that it can serve as a source of information to all members of the rehabilitation team

The physical therapist and anyone else who works with the patient in A D L has to know every single activity, since the specific difficulty has to be related to specific physical therapy measures If a patient for example, tends to fall out of the wheelchair because of inadequate sitting balance, he will need more balancing exercises Similarly difficulty in regard to devices has to be related to occupational therapy measures The nursing service which supervises the patient in performance of many activities learned in A D L, likewise needs to know as many details as possible

In addition to this very detailed information, it is important to the Physical Therapy Department as well as all other departments to have a more general report in regard to the patient s performance in the major group of activities such as bed, wheelchair self-care ambulation elevation and traveling activities His efficiency skill endurance and speed in one or more or all of these groups will determine his status as a bed, wheelchair or ambulatory patient The degree of help he needs will determine whether an attendant is indicated

Finally since the ultimate goal is possible employment one should delineate a patient s independence in terms of units of groups of activities connected with his work The following big units of groups of activities are suggested

I Getting Ready in the Morning
This includes getting out of bed washing grooming dressing and eating breakfast

II Getting Out of the House
This includes using stairs elevator ramp entrance door outside stairs

III Travel to Place of Work
This includes use of
(1) Private car (garage) putting wheelchair in and out of car (in case wheelchair is used)
(2) Public transportation taxi bus (which entails walking to bus station crossing street climbing into bus sitting down getting out of bus walking to place of work etc)

IV Moving Around at Place of Work
This includes using entrance door steps (inside and outside) ramp elevator covering distance from entrance to locker room to work room Getting about in work room Getting from work room to bathroom (How much time is needed in bathroom?)

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Since A D L is only one aspect of the total rehabilitation program the test should be so designed that it can serve as a source of information to all members of the rehabilitation team

Activities of Daily Living Necessary to Independence

7 Op l g d l g d l h l h d
8 Wh l h l h
9 Ch l h l h l
10 Wh l h l l
11 T il h l h l
12 Wh l h l b d/ h
13 B b b b t h l h l
14 Wh l h l bil
15 A bil l
16 Wh l h l fl
17 Fl h l h l

1 Bed p i l
2 E t p l l t b d
3 Wh l h p lti
4 E p l l h l h l
5 Ch l t p
6 E p l t h l
7 E p lti h l t bl
8 Ch bl p it
9 Uph l d b l d/ f t p i l
10 E p l ph l d h l f
11 E p l l il
12 T il p l l
13 D t fl
14 Up fl

II WALKI G ACTIVIT ES

1 W lki g f d 30 f
2 W lki g b k d 30 f
3 Op l g d l l g d d

(U d b L f d C h
W d Oth PP)

1 4 p l lt
2 S g
3 S g tb gb
4 2 p l lt

1 Up 15 d g p 3 f
2 D 15 d g p 3 f
3 Up 6 d d t p h d l
4 D 6 d d p h d il
5 Up 6 d d t p h d l
6 D 6 d d p h d l
7 Up d d fligh f l h d l
8 Up d d fligh f h d il

4

a c (c (a)

9 Up b
b
b b b
b
10 De b
b
b b b
b
11 Up bus t p
12 De b t p

a c

1 C t sd d t t g light
2 Get i h pl i l t til
3 Ge th gh t til d l d h ldi g h d p
4 Sit d d g t p f h t
5 T l t ldd d f b
6 De sd f bus t t t
7 W lk t l 10 f t p d d b
8 De d f t l l d d walk 10 f t
9 W lk f d 300 f t l h p h g
10 C f f l l t p l h dl h

SUM ARY

f l

Activities of Daily Living Necessary to Independence

P S C L DEMANDS OF DAIL LI E FROM BED TO JOB

DATE ____________

NAME ________ WARD ______ AGE ______ SEX ________

ADDRESS ____________ APPARATUS ________________

CAUSE ________ DIAGNOSIS ________________

DISABILITY ________ DATE ONSET ________ DATE REFERRED ________

1 ON LK G ACT VIT ES

2

1 Op

2 Op

3 Op

7 Op

8 Op

9 Op

10 Op

11 Op

12 Op

21 Op

24 Op

25 Op

26 Op

1 Bed

4 30 f

5 30 f

(2) Wheelchair activities?

(3) Self care activities?

(4) Ambulation and elevation activities?

(5) Traveling activities?

(6) Hand activities?

III Can he carry out one or more or all of the following major units of groups of activities and in what time

(1) Getting ready in the morning?

(2) Getting out of the house?

(3) Travel to work?

(4) Moving around at place of work?

IV Does he perform these activities

(1) Exclusively in the wheelchair?

(2) Partly ambulatory partly in the wheelchair?

(3) Exclusively ambulatory?

V Endurance

(1) How long can he be up in the wheelchair?

(2) How long can he be on crutches and braces?

VI Attitude

Does he want to be independent?

Covering distance to lunchroom (How much time is needed to eat lunch?) Adjusting to floor coverings carpet tile, wood etc An estimate of speed of performance for Units I through III will *be very helpful when planning for work It is obviously beyond* the realm of an A D L test to supply the answer to the problem entailed in Unit IV Place of Work This unit is outlined here to show how the discharge summary is related to work This unit will also serve as a guide to the vocational counselor or whoever is responsible for job placement

These four units of groups of activities are of particular interest to the vocational counselor Endurance and speed should be specifically stated in terms of time for each and all units as well as possible help needed this will determine whether it will be feasible for the patient to work outside the home and, if so whether he will be exclusively ambulatory or be working exclusively in a wheelchair or be ambulatory part of the time and be in a wheelchair the rest of the time

In addition to these objective test results there is the important problem of the patient s attitude which cannot fully be tested in a formal testing and teaching situation but has to be observed carefully during the entire program of a given patient When summarizing an A D L test, it is essential therefore to report not only whether the patient *can* be independent but also whether he *wants* to be independent Does he want to be independent seven days a week or just once in a while? Can he function under pressure? No matter how much tension there may be in a crowded hospital or institution there is always more pressure when a person is actually going to work What does independence mean to the patient? Although one strives to train for self-sufficiency in all daily activities it must not be forgotten that there are patients who are completely dependent on an attendant but in spite of it are in charge of their own business

SUMMARY

The information given about a patient in regard to A D L should contain the following points

I Is the patient a bed wheelchair or ambulatory patient? Does he need an attendant? This will depend on the answers to

II Is he independent or does he need help, and if so lifting or assistance in the following groups of activities

(1) Bed activities?

(4) Arousing in the patient creative interests beyond his illness and its problems

(5) Assisting the patient and his family, in cooperation with the social worker in planning for the future

The choice of techniques in attempting to achieve these goals depends on many factors Among these are the patient s interests, his history his previous occupations and the prognosis in the particular case The basic objective is to increase existing ranges of motion by gradually stretching contracted capsules ligaments and tendons about the involved joints This is accomplished through selected occupation which will require the joint to be stretched through the desired excursions For developing muscle strength also this repetitive motion is alternated with decreasing periods of rest as muscle power increases

Since the arthritic for whom occupational therapy has been prescribed is all too often a patient whose arthritis is of long standing with limitations of motion in multiple joints it is important in starting treatment to stress first those joint motions which are most essential to the patient One should thus evaluate not only the patient s abilities but also the skills he needs most to carry on his daily life In the case of the elbow for example, it is more important to increase limited elbow flexion than to seek complete extension since the latter is not essential for the patient in feeding himself for bathing etc Similarly in selecting occupational activities to increase motion in the knee complete extension which is needed for correct posture in weight bearing and walking is a far more important goal than full flexion the latter being a range rarely used

In working with the arthritic the therapist should closely supervise the patient to prevent substitution of undesirable motion and to teach him to avoid compensation by using other parts of the body It is essential in some cases to stabilize one part of the body in order to achieve desired motion This may be done with temporary splints, with a sling or with other support to hold one part fixed while permitting the desired motion In working to increase pronation and supination of the forearm, for example it is advisable to have the elbow flexed to approximately 90 degrees to avoid rotation of the shoulder Proper positioning is also important because the motion achieved in a given activity varies with the placement of the material and equipment in relation to the patient s body Good body mechanics should be stressed and the patient must be trained to be consciously aware of this

Occupational therapy should be started during the acute stage of the illness, even while the patient is in bed At this stage activities of daily

10

Occupational Therapy

RHEA K OLSON

Occupational therapy is any activity, mental or physical, definitely prescribed and guided for the distinct purpose of contributing to and hastening recovery from disease or injury So defined it implies *active* participation of the patient, in contrast to those forms of treatment in which something is done *to* the patient and also requires the element of interest in the activity on the part of the patient and a medical purpose in the specific occupation

Occupational therapy for the arthritic has assumed increased importance as physicians and patients have become more alert to the permanent joint restrictions which occur when active physical motion is deferred too long Muscular contractures and restricted joint motion often can be traced to lack of supervised constructive use of affected joints during and following the acute stage of the illness All too familiar is the dejected arthritic with poor posture tense expression and the fear of frequently experienced pain sitting with hands clasped together waiting for someone to do something for him Often the hands are already deformed with flexion contractures due as much to disuse as to the disease process in the joints With earlier diagnosis and medical treatment and the prophylactic use of physical and occupational therapy fewer arthritics need sustain the disability which results from lack of use

PRINCIPLES OF THERAPY

The goals of occupational therapy for the arthritic are

(1) The maintenance and/or the restoration of muscle strength

(2) The maintenance and/or the restoration of joint ranges of motion

(3) The prevention of further deformities by training the patient to use his joints in ways which will avoid their development This includes

(Figure 52), it should be stressed that whenever possible the hands should be used with the fingers extended and the wrists in hyperextension and hand activities requiring rotary motion as in stirring or beating should be done toward the body rather than away from it to counteract the tendency toward ulnar deviation

THERAPY MEDIA

One of the most adaptable occupational therapy media for use by the arthritic is clay (Figure 53) It is inexpensive easily obtained in small



FIGURE 53 A warm mixture of clay is an excellent medium for early hand exercises The consistency of the clay may be varied to tolerance

quantities when necessary does not require elaborate equipment and can be worked with in bed it can be heated in an oven in a top of the-stove ovenette or in the upper part of a double boiler If a kiln is not available for firing serviceable ceramic ware can be achieved by the use of self hardening clay or clay that can be hardened by being baked at the comparatively lower temperatures of a home oven It should be noted that with the increased interest in ceramics as a hobby even small communities may have a ceramic studio where pieces of clay work can be fired for a very small charge and where supplies can be purchased

In using clay as a therapeutic medium for arthritics two techniques are especially valuable One is the forming of sausage rolls by rolling the clay with the fingers in extension and then building the coils into bowls or ash trays If the ridges between the coils are to be smoothed out this is done with the fingers extended using wet fingers or a wet cellulose sponge Another way of manipulating the clay for therapeutic exercise is the slab method A lump of clay is rolled out flat and trays plates or bowls are cut and shaped from the flattened clay For this a French pie pin should be used the fingers are thus kept in extension and the wrists

living often can be used as a means of therapeutic exercise to condition the patient to gradually increasing activity Therapy may start with the use of small, lightweight objects (Figure 51), such as those used in washing and drying the body, brushing the teeth, shaving and the application of make up As the patient s strength increases with subsidence of the acute stage of the arthritis so also may the size and weight of the objects being handled be increased



FIGURE 51 Practicing buttoning on a button board



FIGURE 52 Retraining in home making activities The fingers are in a desirable extended position

When the patient becomes ambulatory, or even while he is still using a wheelchair much progress can be made in the improvement of joint motion and of morale through the use of homemaking activities as graded exercise Periods of rest from physical activity may be utilized for planning necessary changes in the patient s home Many hospitals now have special kitchens for providing homemaking training for the disabled These are of particular importance to the arthritic male as well as female The patient who is disabled to the extent that gainful employment outside of the home is impossible may in many instances be retrained to attend to his personal needs to manage a good part of the care of the home and thus to relieve another member of the family for employment outside of the home

Most of the training programs for the disabled homemaker include visits by the therapist to the patient s home either during the hospital stay or following the discharge to help the patient adapt available equipment to her use In some institutions professional home economists guide this program, but in most instances this is a responsibility of the occupational therapist In helping the arthritic plan homemaking activities

(Figure 52) it should be stressed that whenever possible the hands should be used with the fingers extended and the wrists in hyperextension and hand activities requiring rotary motion as in stirring or beating should be done toward the body rather than away from it to counteract the tendency toward ulnar deviation

THERAPY MEDIA

One of the most adaptable occupational therapy media for use by the arthritic is clay (Figure 53) It is inexpensive, easily obtained in small



FIGURE 53 A warm mixture of clay is an excellent medium for early hand exercises The consistency of the clay may be varied to tolerance

quantities when necessary does not require elaborate equipment and can be worked with in bed it can be heated in an oven in a top of the-stove ovenette or in the upper part of a double boiler If a kiln is not available for firing serviceable ceramic ware can be achieved by the use of self hardening clay or clay that can be hardened by being baked at the comparatively lower temperatures of a home oven It should be noted that with the increased interest in ceramics as a hobby even small communities may have a ceramic studio where pieces of clay work can be fired for a very small charge and where supplies can be purchased

In using clay as a therapeutic medium for arthritics two techniques are especially valuable One is the forming of sausage rolls by rolling the clay with the fingers in extension and then building the coils into bowls or ash trays If the ridges between the coils are to be smoothed out this is done with the fingers extended using wet fingers or a wet cellulose sponge Another way of manipulating the clay for therapeutic exercise is the slab method A lump of clay is rolled out flat and trays plates or bowls are cut and shaped from the flattened clay For this a French pie pin should be used the fingers are thus kept in extension and the wrists

living often can be used as a means of therapeutic exercise to condition the patient to gradually increasing activity Therapy may start with the use of small, lightweight objects (Figure 51), such as those used in washing and drying the body brushing the teeth, shaving and the application of make-up As the patient s strength increases with subsidence of the acute stage of the arthritis, so also may the size and weight of the objects being handled be increased

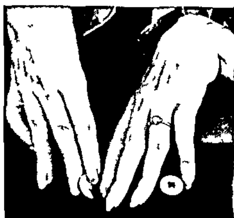


FIGURE 51 Practicing buttoning on a button board



FIGURE 52 Retraining in home making activities The fingers are in a desirable extended position

When the patient becomes ambulatory or even while he is still using a wheelchair much progress can be made in the improvement of joint motion and of morale through the use of homemaking activities as graded exercise Periods of rest from physical activity may be utilized for planning necessary changes in the patient s home Many hospitals now have special kitchens for providing homemaking training for the disabled These are of particular importance to the arthritic, male as well as female The patient who is disabled to the extent that gainful employment outside of the home is impossible may in many instances, be retrained to attend to his personal needs to manage a good part of the care of the home and thus to relieve another member of the family for employment outside of the home

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being very soft copper more resistive), and the size of the disc In making ash trays for instance a five or six inch diameter disc is usually easiest for the arthritic to manage A three inch disc, while more quickly finished into an attractive coaster or individual ash tray is harder to keep in the mold and small objects are harder for the arthritic to polish In polishing the sheets of emery cloth should be used with the fingers extended Hammers used for the metal shaping may be light or heavy, large handled or small, and may be made of wood rubber, rawhide, or metal



FIGURE 55 Weaving can be arranged to provide almost any needed motion

As with many other tools the handles may be built up or their angles may be changed Here too proper positioning of the work is very important

Many other forms of artwork crafts or light assembly work can be used to provide the arthritic with similar constructive exercise or for prevocational testing

RELATION TO OTHER FORMS OF TREATMENT

In considering the relationship of occupational therapy to other forms of treatment it is important to keep in mind the correlation between physical and occupational therapy Whenever practical the treatment periods should be synchronized so that occupational therapy follows physical therapy Many of the physical therapy modalities which benefit arthritics utilize heat in some form This usually relaxes muscles thus the patient will derive greater benefit from active exercise in occupational therapy if it follows immediately With attention centered on the object being made or the work at hand there is less consciousness of pain and the patient is more likely to carry through a repetitive activity for a longer period without boredom and fatigue than if he were given the same type of motion as pure exercise

in hyperextension (Figure 54) In using this method to construct a *ceramic cigarette or candy box the sides and bottom are cut from the* rolled clay and are joined to each other with slip (clay in a semiliquid form)

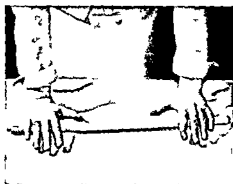


FIGURE 54 A French pie pin provides good extension exercises for fingers and wrists

Reed for basketry is another material which can be valuable as a creative exercise medium This may be graduated in size and thickness as the patient s strength permits Very fine reed and small projects provide light exercise for fingers and wrists and do not require too long an attention span Heavier materials longer spokes and weavers require greater resistance larger motions and a longer attention span The exact motion achieved depends on the length of the spokes and weavers where the weaver is held and where the work is placed in relation to the body Patients should not be allowed to work at this craft for extended periods if their skin is sensitive to abrasion

Cord knotting woodworking including sawing sanding planing hammering and the use of a screwdriver to obtain pronation and supination and finger painting with use of the painted papers for the making of portfolios and other bookbinding projects are all valuable crafts which can be adapted to the needs of the individual patient

Many types of weaving (Figure 55) are useful for the arthritic from the simple braid weaving on an upright frame using the extended fingers as a beater to weaving on a two or four harness floor loom Weaving can be arranged to provide almost any needed motion It can be simple and relaxing or very complex requiring great concentration it can use fine or coarse materials and it can be adjusted with special handles on the beater or with suspended weights to provide gradations of resistance

Metalwork especially the hammering of bowls and trays is another craft which can be varied depending on the gauge or thickness of the metal used the degree of hardness of the metal (aluminum and pewter

11

Wheelchair Prescription

EDITH BUCHWALD LAWTON

The wheelchair is an important device in the rehabilitation of the permanently disabled nonambulatory or partly ambulatory patient If carefully adjusted to the patient s needs, it can be of great help in enabling him to become more independent in his daily activities If the wheelchair, however is not adjusted or cannot be adjusted to the patient s needs, it may interfere greatly with his progress The big wooden wheelchair for example can never be brought near enough to the bed or to any other furniture to facilitate transfer to and from the wheelchair nor can it be folded and placed in a car A collapsible metal wheelchair with removable armrests and footrests will often help to free the patient from being confined to his bed his room and even to his home It is essential therefore to select carefully a wheelchair with all the necessary adjustments for the patient This is especially important for the arthritic patient, who so often encounters unusual and complex problems in regard to movement and sitting posture

The optimum goal in any rehabilitation program is to make the patient completely independent in his daily activities Obviously this is not always possible since deformities may be so severe and motion so restricted as to necessitate constant help for the patient Frequently wheelchair adjustments will aid to the extent that the patient can at least perform part of the necessary basic motions so that lifting may be eliminated Even when the patient cannot perform any motion at all appropriate wheelchair adjustments will assist the person who has to help the patient

The basis for a wheelchair prescription primarily depends upon the physical examination of the arthritic patient by a competent medical staff this must include evaluation of joint ranges of motion ability to move muscle strength deformities endurance etc In addition the wheelchair and its adjustments must be selected with due consideration for the fur-

Although occupational therapy should be started early while the patient is still confined to bed, the patient should be treated as soon as possible in the workshop away from the ward or hospital room Here the atmosphere is more informal the patient has the advantage of seeing the improvements that others are making and in general obtains some of the benefits of group therapy A greater range of activities can be made available here to him and he can be more constantly supervised by the therapist for posture for technique, and for the proper balancing of work and rest periods The optimum length of a work period depends upon the patient s general physical condition and on the stage of the illness The therapist should guard against excessive fatigue and should watch for any increase in joint discomfort If the latter persists over a 24 hour period the patient is probably overdoing The physician however is the one who can best set the limits and if the patient seems to be unduly fatigued he should be referred back to the physician for re evaluation of the prescription and working periods It is always necessary to work out individual treatment plans to meet each patient s needs

Following hospitalization the patient should return to the outpatient shop for follow up observation and for further treatment if necessary The outpatient shop can also assist in the learning or re-establishment of good work habits and in prevocational exploration This is especially valuable when retraining is necessary because the previous occupation has been a contributing factor in the progress of the disease or because the individual is disabled to the extent that he can no longer continue with his previous work Another advantage of the outpatient treatment center is the socialization factor This is especially important for those persons who have become self-centered as a result of their illness, participation in group activities diverts them from their own problems and thus affords additional benefit

formed patient, special parts, such as seats, or the entire wheelchair may have to be custom built

OUTLINE OF WHEELCHAIR ADJUSTMENTS *

Type of Wheelchair

For close approach easy handling good posture, easy transportation and storage, a collapsible metal wheelchair with various adjustable attachments is preferable to the big, nonadjustable wooden wheelchair

Sizes Adult Junior, and Tiny Tot sizes (three different ones) are available Because space is usually at a premium it is better in general to use a chair with the smallest possible overall measurements Quite often adult patients who are small and lightweight can use a Junior chair to advantage since its width and length are about 2 inches less than in the standard Adult chair

Overall Measurements In an Adult standard wheelchair with big wheels in the rear removable armrests and footrests, the measurements are

Overall width 25½ inches
Overall length 39¼ inches (minus 11 inches if footrests are removed)
Height of seat, 20 inches

These measurements should be considered in relation to furniture the width of doors the general layout of the home and possible place of work An area of about 5 feet square is needed to turn the wheelchair completely around

Wheels

The Big Wheels For most patients, it is more practical to have the big wheels in the rear of the wheelchair rather than in front This facilitates sideward transfer (by sliding to bed toilet tub shower car, etc) a method used by many patients but exclusively by those who cannot extend their knees because of severe knee flexion deformities To transfer sideward the armrest is removed If the big wheels are in front they obstruct this sideward transfer (Figure 56)

* The measurements given in this outline are taken from the Everest and Jennings standard Adult wheelchair with the big wheels in the rear and with removable armrests and footrests For complete and detailed measurements different catalogues should be consulted

niture that he will use in his home and at work The considerations are the same whether the patient can move independently or requires assistance These in general are concerned with

(1) *Transfer to and from the wheelchair* The ability to transfer from bed, toilet, tub, shower, and car is important for most self-care and traveling activities It is essential therefore to provide a close approach and thus reduce the distance between the wheelchair and the bed (or other furniture) to a minimum This may be facilitated by adjusting the wheelchair (by means of removable armrests, footrests, open backs etc) and by rearranging furniture to permit easy accessibility from the wheelchair In addition, the heights of the wheelchair seat the bed and other furniture should be equalized insofar as possible to simplify transfers This may be accomplished by adjusting the height of either the wheelchair or the furniture or of both to conform to one another

(2) *Ease in handling the wheelchair* The more this can be simplified the greater become the mobility and independence of the patient Independent propulsion often can be improved by special attachments for easier grasp of wheels Good posture and sitting comfort may be aided by an adjustable backrest or suitable cushions and transportation and storage are greatly simplified by selection of a chair which is collapsible

(3) *Overall wheelchair measurements* In the selection of a wheelchair, due consideration must be given the environments within which it is to be used that is the width of halls and doorways the dimensions and the clearances within kitchens bathrooms working areas, etc The prescription of special features on a wheelchair may be restricted by environmental factors or conversely the need for these features may dictate changes in the environment

In weighing the possible advantages and disadvantages of wheelchair adjustments for the arthritic patient one must remember that while an adjustment may facilitate one function it may at the same time render another more difficult The motorized wheelchair for example simplifies propulsion but may make transferring more complex In such cases one must decide in the light of his overall rehabilitation goal which is the most important for the independence of the particular patient

Another cogent reason for careful and detailed wheelchair prescription is the high cost of wheelchairs and the fact that most adjustments have to be selected at the time the wheelchair is ordered since only a few minor adjustments can be made on the completed chair For the severely de-

difficulty in reaching this smaller wheel Often one cannot tell in advance which wheel size will be the best for a patient wheels cannot be exchanged after the wheelchair is made unless an extra wheel axle for a 20 inch wheel is ordered in which case the wheels can be interchanged at any time The final choice of a 20- or 24 inch wheel will be decided by whether it is more important in a particular case to facilitate transfer or propelling the wheelchair The height of the standard wheelchair seat is the same (about 20 inches) whether the chair has 20 inch or 24 inch wheels

Hand Rims Hand rims are attached to the big wheels and are standard equipment on all wheelchairs They permit turning the big wheels without having to grasp the dirty tires which are in constant contact with the ground To facilitate turning the following adjustments are possible

(1) Tape may be wound around the hand rims to provide added friction and thus help patients with weak grasp

(2) Hand rims may be offset to help patients to grasp more easily These should not be offset from the big wheel more than 1½ inches (double the standard ¾ inch) lest the overall width of the wheelchair be increased too much

(3) Heavy spokes may be attached to the hand rim to facilitate grasping



FIGURE 58 Knobs and removable footrests Knobs on hand rim to facilitate turning wheels Patient cannot grasp but pushes with heel of hand against knobs One foot rest is removed so that patient can steer wheelchair with foot since he can use only one hand

(4) Knobs (Figure 58) may be added Wooden knobs can be attached with screws at regular intervals around the circumference of the hand rim or metal knobs covered with rubber tips to protect the skin may be welded around it at regular intervals These knobs are useful to

It also allows close approach to bed car etc , when transferring is performed by sliding forward from the wheelchair and backward into it (Figure 57) Big wheels in front prevent this close approach

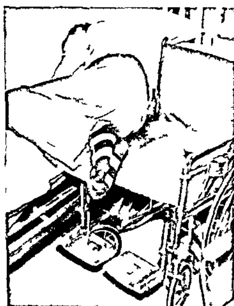


FIGURE 56 Big wheels in rear and removable armrests facilitate sideward transfer Note also removable ash tray



FIGURE 57 Big wheels in rear facilitate forward transfer Upholstered armrests for better grasp Removable brake for easy reach

A third advantage is that it counteracts any tendency by patients with severe rigidity of the spine to fall forward since to reach the big wheels in the rear of the wheelchair they have to lean slightly back

Big wheels in the front are at times useful to enable some patients with only slight wrist motion, and no or only slight backward movement of the arm to propel the wheelchair provided the patient can stand up when transferring

Diameters of the big wheels A standard big wheel is 24 inches in diameter the rim of this wheel extends about 4 inches above the standard wheelchair seat This will obstruct sideward transfer if the patient cannot clear the big wheel In such cases a 20 inch wheel may be ordered which will be about the same height as the standard wheelchair seat level Patients with unusually short or severely deformed arms may have great

by a patient who has use of only one arm and hand If the patient however, has sufficient power in one or both legs to 'walk while sitting in the wheelchair ' he can use this walking to steer the wheelchair and the one arm drive is unnecessary (Figure 58)

This kind of wheelchair is also collapsible As with the standard model chair, the big wheels in most cases should be at the rear The one arm drive wheel can be changed to a standard big wheel at any time

Armrests

Standard armrests are about 9 inches high but can be made to any necessary height Removable armrests and removable desk arms are preferred to standard stationary armrests because both make sideward transfer easier and desk arms allow close approach to tables desks, work benches etc regardless of their height

Armrests should be upholstered with foam rubber and covered with leatherette or plastic for comfort and to facilitate grasping In addition this increases the height about 1½ inches and thus provides better leverage for patients who push on armrests while transferring It also helps in supporting deformed arms

Desk arms can be reversed so that the jog which is usually in front is in the rear thus permitting the patient to reach the big wheels more easily

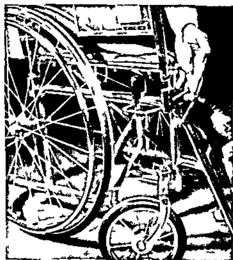


FIGURE 60 Removable upholstered armrests pinlocks

Pinlocks are used to secure armrests in place (Figure 60) and skirt guards (metal plates attached to the armrests) are standard equipment on all wheelchairs to protect clothes from tires

patients who cannot grasp but who can push with the heel of their hands against these knobs to turn the wheels

Small Wheels or Casters Casters of 8 inch diameter are preferable to 5 inch ones since they are easier to propel over obstacles such as gravel cobblestones doorsills carpets etc

Tires Standard rubber tires are usually to be preferred Pneumatic tires make it easier to propel the wheelchair outdoors but are more difficult to handle when using the wheelchair indoors

Brakes All standard wheelchairs have brakes which lock the big wheels in place, these are covered with rubber tips to protect the skin Standard brake handles extend to about the height of the wheelchair seat Extension brake handles of any length may be ordered for those patients who because of deformities cannot reach the standard length ones These are removable so as not to obstruct sideward transfer from and to the wheelchair (Figures 57 and 58)

One Arm Drive Wheelchair (Figure 59)

On this type of wheelchair one big wheel either on the right or left (as needed) has two hand rims One hand rim turns the wheel on the

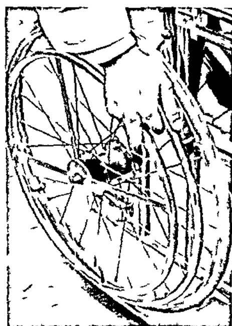


FIGURE 59 One arm drive

same side of the wheelchair the other one turns the opposite wheel with which it is connected by a folding axle If both rims are turned at the same time the wheelchair will move in a straight line It may thus be propelled

and/or knee and/or ankle joints They are attached to the frame above the 8 inch or 5 inch casters, parallel to the ground, without the standard tilt

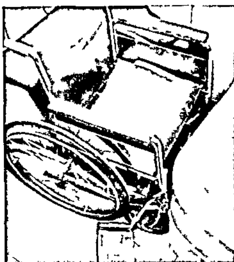


FIGURE 63 Removable footrests to allow close approach to tub (Applies also to bed car etc)

Legrests, Heel Straps, Heel Loops, Blocks

To prevent heels and lower legs from slipping backwards, various attachments may be used

Legrests are used if support of the entire lower leg is necessary They are made of fabric plastic leatherette (Figure 65) or wood (Figure 62) with or without foam rubber padding as indicated and attach with clamps to the footrests so that they can be removed when the footrests are turned up or removed

Heel straps from 1 inch to 4 inches in width are used if not too much support of the lower leg is needed

Heel loops with one loop attached to each footrest (Figure 64) are preferred to heel straps if the objective is only to prevent the heels from



FIGURE 64 Heel loops to prevent heels from slipping back

Footrests

Footrests can be adjusted in length (Figure 61) and height (Figure 62) Adjustments in length accommodate the footrests to the great individual differences in length of even normal lower legs, or to the severely deformed and therefore often extremely short lower extremities

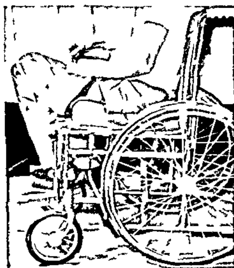


FIGURE 61 Parallel platforms to accommodate severely deformed lower extremities Armrest is removed to show cushion on seat Contoured posture back cushion to accommodate back deformity



FIGURE 62 Removable footrests adjustable in height with wooden legrests to accommodate restriction in knee joint

Adjustments in height can be made by means of elevating legrests These can be raised to any angle from 0 to 90 degrees, an essential adjustment for patients whose knees and/or hips are fused in various positions Elevating legrests are standard equipment on semi and fully reclining wheelchairs but can be ordered for any standard wheelchair To provide support for the entire lower leg wooden legrests are attached foam rubber padding can be added if so indicated

All footrests should be removable (Figure 63) whether adjustable only in length or in length and height This allows close approach when the patient is transferring to bed tub shower toilet car etc and reduces the overall length of the wheelchair by 11 inches in a crowded space, as in the bathroom or elevator in a private home or when placing the folded wheelchair in a car

Parallel platforms (Figure 61) may be used instead of standard footrests to accommodate severe deformities resulting from ankylosed hip

help to patients who cannot sit up straight because of severe hip joint deformity or marked rigidity of the spine The semi and fully-reclining wheelchairs always have footrests that are adjustable in length *and* in height Footrests and legrests should be removable



FIGURE 66 Reclining back to accommodate hip joint deformity Removable headrest

Seats

The standard wheelchair seat combined with the various adjustable footrests is usually satisfactory for patients whose lower extremities are not exceptionally long or short Its standard depth is 16 inches This can be increased to 22 inches with a special depth seat to accommodate long thighs The standard height of 20 inches can be increased to 22 inches and cushions of varying thickness will add somewhat to the height In accommodating to the length of the lower legs the height of the seat and the length of the adjustable footrests must be considered

Cushions and Boards Cushions should be used for the seat and/or back to provide comfort as well as good posture

Foam rubber cushions 1 2 3 or 4 inches thick (Figure 61) with leatherette or plastic coverings facilitate smooth sliding They should have cloth coverings if the skin is sensitive and must be kept absolutely dry

Boards ¼ inch or ½ inch thick for the seat and/or the backrest may be placed beneath the cushions to prevent sagging This is especially important when the patient is very heavy

A McCarthy Sacro Iliac Cushion may be used without a board, since it has a metal frame which will prevent sagging It is made of foam rubber is available in 1 inch and 2-inch thickness and is covered with leatherette or plastic

slipping back These loops stay on the footrests and do not have to be removed when handling the footrests whereas heel straps and fabric legrests must be removed

Blocks can be mounted on the footrests or platforms to support severely deformed feet and/or ankylosed ankles

Backrests

The standard backrest 16 inches high reaches to about the height of the shoulder blades and is satisfactory for the patient with good sitting *balance and no hip joint deformities*

Snap Back The backrest may be attached *with snaps (Figure 65)* instead of the standard screws if the back is to be opened to enable the patient to transfer backwards out of his chair This is often the only method possible for using a toilet when the crowded bathroom area does not permit turning the wheelchair around By opening the backrest, the patient can slide backwards over the toilet



FIGURE 65 Snapback plastic leg panel Backrest is opened so that patient can slide backward onto toilet Plastic leg panel to support lower legs

Headrests

If extra support for the neck and head is necessary, a removable hook-on type headrest (Figure 66) can be added This headrest is always part of the semi- and fully reclining wheelchair

Semi Reclining and Fully Reclining Wheelchairs

These have a backrest that supports the entire back as well as the neck and head (The headrest is removable) The semi reclining backrest can be lowered to any angle from 90 to 120 degrees the fully reclining to any angle from 90 to 180 degrees (Figure 66) These wheelchairs are of great

this wheelchair can be controlled by a mere touch of a finger it is useful for (*a*) patients who have no other motion (*b*) patients whose motions have to be restricted for medical reasons or (*c*) patients who have to propel the wheelchair long distances at work

It is not desirable for patients for whom propelling the standard wheelchair is a necessary exercise In regard to sideward transfer one should remember that the armrest on the side of the controls must be stationary



FIGURE 68 Motorized wheelchair operated with a single toggle switch

All Purpose Chair (Figure 69)

This chair has 4 small wheels 8 inches in diameter and can be propelled independently by patients who have sufficient movement in their legs so that they can propel and steer the chair by walking while sitting

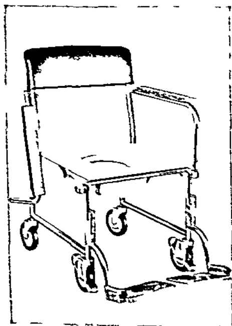


FIGURE 69 All purpose chair with removable armrests and footrests and collapsible Used (1) with bedpan as a commode chair (2) without bedpan but with cut-out seat placed over toilet so that toilet can be used without transferring to it (3) with regular seat in crowded spaces (narrow door ways, bathroom etc) at home and at work

A contoured posture back cushion helps to accommodate back deformities (Figure 61)

For patients who cannot push up on their hands the bed should be adjusted to the height of the wheelchair seat to facilitate transfer sideward or forward from wheelchair to bed and back In taking measurements, the patient should sit in the wheelchair on the cushion and board he is using so that the exact height of his sitting surface can be determined It is desirable not to make major changes in the height of the wheelchair seat, since this will necessitate changes in height of the backrest and possibly of the armrests

Hydraulic Seat A hydraulic seat (Figure 67) is available which can be used interchangeably with a standard wheelchair seat It may be lifted out of the wheelchair when the latter is folded This hydraulic seat elevates from a height of 20 inches to 29 inches and is helpful (*a*) for patients who have difficulty standing up from a low seat (*b*) for patients

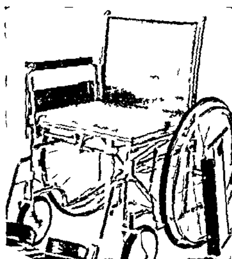


FIGURE 67 Hydraulic seat can be raised from 20 to 29 inches to facilitate standing up and sitting down for patients who have difficulty doing so from a low seat

who although they cannot walk can transfer from bed to wheelchair once they are in a standing position (*c*) for patients who cannot transfer from wheelchair to car because of the differences in height between the wheelchair and most car seats and (*d*) for patients confined to a wheelchair who must reach and work at various levels from the wheelchair at home or on a job

Motorized Wheelchair (Figure 68)

This wheelchair has button or joy stick controls which can be managed by the touch of a finger It is powered by long running batteries which can be charged at any standard light plug (110 volts AC) Since

12

Modern Materials and Methods for Splinting

MURIEL ZIMMERMAN

With the greater effectiveness of modern treatments for the management of arthritis the threat of deformity has decreased There is also less need for splints for protection of joints Resting splints, for example, which so often in the past were necessary during acute phases are now infrequently used The situation is however, a relative one and splints are at times positively indicated Occasionally during acute phases of the arthritis process therapeutic exercises together with medical measures will not alone prevent deformities Where deformity already exists splints may be helpful for assisting in effecting reversal of the deformity Finally, and most frequently splints are useful as devices to protect deformed joints from unnecessary traumas which might produce worsening of the mechanical problem In this instance it is highly desirable to fabricate the splint so that it provides maximum protection with a minimum of impairment of function An ulnar deviation splint for example has limited practical value if complete use of the hand is sacrificed for the period of its application Fortunately many new materials are now available for construction of splints These render it possible to make strong lightweight durable splints which can be readily modeled to even very bizarre deformities In addition this versatility frequently permits preservation of function while at the same time providing the protection desired The old plaster shell type of splint has thus been antiquated by modern materials

FIBERGLAS

Fiberglas * (Figure 70) is a very strong material probably the strongest of any in ratio to thickness It is durable does not crack, and is non-

* Vernon Benshoff Company

The advantage of the chair is that it is only 19 to 20 inches wide (stand ard chair is 25½ inches), so that the patient will have no difficulty when encountering narrow doors hallways etc

It may be ordered with removable armrests and footrests and collapsible thus making transportation and storage easier A cut out seat is available so that the chair may be used as a commode chair or may be backed up over a toilet for use without the need for transferring Many patients find it practical to have this kind of chair in addition to their regular wheelchair, for use in narrow bathrooms motels hotels, etc while visiting or vacationing

Miscellaneous

Coverings As a covering for the seat back, or cushion leatherette or plastic is most practical since this type of material can be easily cleaned and provides a smooth sliding surface which makes it easier for the patient to transfer to and from the wheelchair For the patient whose skin must be kept absolutely dry a cloth covering is best since cloth is ab sorbent and plastic is not

Trays Different kinds of trays which rest on the armrests can be used to permit the patient to read, write eat etc, independent of tables, desks and other furniture

Crutch Holders and Ash Trays These are practical accessories and can be attached to the wheelchair

Name Plates These are recommended for identification of the chair of patients in an institution

is needed between the cast and the mold For this, a thin layer of vaseline or a solution of water glass (sodium silicate) obtained from the drugstore or chemical supply house and diluted half and half with water may be used Duroc dries hard and fast, gives a hard solid mold that won t break when worked with, and in half an hour s time is completely set and dried This positive impression then becomes the model upon which the finished Fiberglas product is molded

The positive plaster mold in turn also must be coated first with a separator This may be a coating of Lux flakes made into an emulsion shellac, or a special commercial separator * If shellac is used a coating of soap flakes over the shellac should also be used On a hard material such as dental plaster the Lux flakes emulsion is satisfactory but if regular plaster is used the additional coat of shellac is necessary Fiberglas fabric which comes by the yard is then cut to the desired size Two layers generally are sufficient After the material has been cut and the separator is on the mold the resin † with which the Fiberglas is to be impregnated is mixed This comes in two components A and B, the latter is in a smaller can and is the activator Four parts of A are mixed with one part of B and the resultant mixture chemically reacts to harden and set without the need for heating The resin thus mixed is spread over the mold heavy rubber gloves (not thin ones) should be used The Fiberglas material is then placed on top and rubbed until the resin has penetrated through it Another layer of resin is applied and a second layer of Fiberglas material added and rubbed as before This is then left to dry At room temperature, drying takes a minimum of seven hours The setting process may be hastened, in an ordinary oven at 180° F setting will take place in a half hour s time When hardened, the splint is pried loose from the mold and its edges trimmed with metal shears and sanded for smoothness No extra finishing is needed Holes may be drilled for ventilation these should be placed where the device does not take strain or pressure

There is a certain amount of toxicity to the activator used in the above process though not to the finished product Persons who are very sensitive may react to it and not be able to work with it Hence as with many plastics precautions must be taken The material should not be allowed to harden on the hands Once it hardens there is no known solvent, and the chemical may produce a skin reaction Before it hardens however,

* Vernon Benshoff Company

† Fiberglas resin actually an epoxy resin is available under many trade names Ortho Bond is distributed by Vernon Benshoff Company

breakable Considerable force can be put upon it, yet it has a certain amount of flexibility, especially when there is not too much contour It can be scrubbed with soap and water for cleaning and it is cosmetically acceptable The material for a splint costs about $1 00 a square foot, *including all the material used in making it*

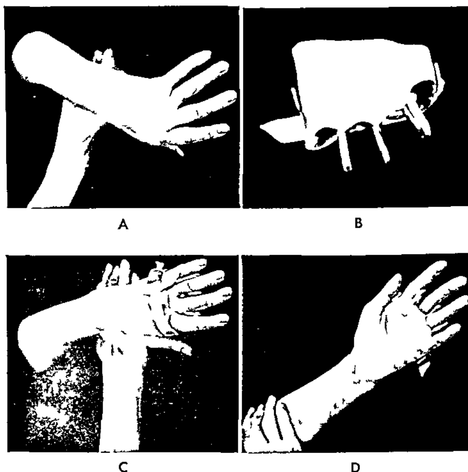


FIGURE 70 A Typical ulnar deviation deformity B Molded Fiberglas splint C and D Splint in place Note that finger freedom is minimally restricted by the corrective device

Fabrication of a Fiberglas splint is a threefold process First of all a plaster cast of the part must be taken For this three layers of specialist plaster bandage are applied directly to the skin using just a little vaseline as a protective coat if additional protection is needed a piece of stockinet may be used From the plaster cast (or negative mold) a positive mold is then made using Duroc or similar material which may be obtained from a dental supply house This is mixed like ordinary plaster in the proportion of about 22 parts of plaster to 100 parts of water A separator

DIREKT-FORM

Direkt Form * is made of lightweight interwoven aluminum wire, in one direction the wires are covered with a rayon tubing The material is pliable and can be bent and shaped directly on the body When the desired mold is obtained, it is removed and a hardener applied this may be done by dipping or by painting the hardener on The hardener dries with the consistency of celluloid so that it is not too hard A filler may also be rubbed in for greater smoothness The finished product is not too strong, but for temporary splinting it is useful and quick

ALUMINUM

For metal splints, aluminum (Figure 72) is still the most satisfactory material Steel will corrode and Monel metal is heavy, the latter however has usefulness because it has a permanent finish The most frequently used gauge of aluminum is 24ST When the device or splint must be quite malleable 52SO is best When strength is desired, the much harder gauge, 75ST, is useful

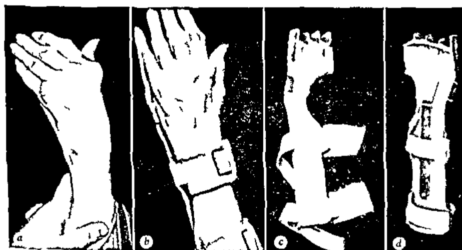


FIGURE 72 Lightweight aluminum splint to correct both ulnar deviation and wrist flexion deformity

NYLON

Nylon is available in sheets and in rods It is rather expensive but it is tough flexible and about one seventh lighter in weight than steel Its main properties are strength and flexibility it may be bent practically

* Direkt Form Corporation

it can be cleaned off with alcohol To avoid skin contact, a paper cup is used for mixing, any residue is left to harden in the cup and discarded Measuring spoons are used for the material and are replaced as necessary Finally, one should work in a well ventilated area and preferably for no longer than half an hour at a time Most splints can be molded in this period if not, the work must be done in two sessions Once the splint hardens the only reaction which it may produce is a mechanical one which the patient with sensitive skin may develop from irritation by any inert material

CELASTIC

Celastic (Figure 71) is a popular material that looks like felt and is available in different thicknesses When it is dipped in a special solvent which is mostly acetone or in pure acetone, the material softens so that

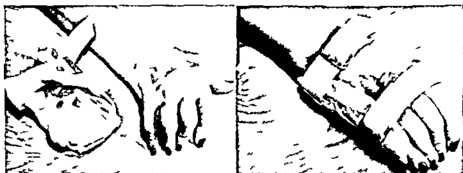


FIGURE 71 Celastic splint for correcting ulnar deviation is heavier and bulkier than Fiberglas

it can be shaped into a splint A protective separator must be used on the skin because of the acetone Though stockinet may be used thin plastic sheeting offers greater protection the disadvantage of the latter is that it does not stretch smoothly and may wrinkle The Celastic is then shaped to the part and is kept there long enough to begin to set This takes 20 to 30 minutes and even then it must be handled carefully so as to retain shape when taken off It is then allowed to dry and harden About two layers are needed for strength Celastic s disadvantages are that it shrinks a little and turns a gray color as it dries For a permanent finish two or three coats of lacquer may be applied or it may be painted The finished product is thicker and bulkier than Fiberglas It is also more difficult when working on the hand to get a good fit with Celastic

13

Self-Help Devices

RHEA K OLSON, MURIEL ZIMMERMAN, *and*
EDWARD W LOWMAN

THE CONCEPT

A self help device is a mechanical apparatus with which the patient may help himself to be independent in any activity especially in the realm of activities of daily living This terminology unfortunately sometimes restricts one s thinking to eating dressing personal hygiene and communications devices however may be needed just as acutely in the much broader areas of travel, homemaking and housing adjustments and in vocational and avocational activities as well

Devices should not be used unless they are necessary Fortunately, it has been found that the patient who does not actually need a device will soon discard it and only a few will continue to rely upon it as a crutch

A self help device may be used either to compensate for permanent disability to protect and support during recovery or to start an activity before strength or range of motion is sufficient to perform it without support or assistance When devices are used in the earlier stages of recovery one must be sure that they are protective as well as assistive devices and that they will not overstretch or overstrain the muscles or joints involved

In selecting devices certain matters of general medical information are of importance the diagnosis the patient s age the duration and extent of the disability the prognosis and the social and psychological factors One must have this complete picture before evaluating a specific device In the case of a recent disability for example, it may be apparent that the patient is expecting complete recovery and that he regards any device as a badge of disability At this stage he often will reject all devices regardless of how much they may help him At the other extreme the patient who has been disabled for years is usually enthusiastically

double without breaking Cutting is done on a lathe just as with metal It is especially useful for flexible parts such as hinges and in sliding parts the use of nylon reduces friction to a minimum In joints, nylon against nylon has the highest rating for reducing friction to a minimum, and at the same time it holds up fairly well Gears are now being made out of nylon because these last longer and require no oiling The only dis advantage is that under a constant load it will after a time take on a certain amount of permanent deflection Skin reactions to this type of nylon are usually nonallergic but of the heat rash type

LINING MATERIALS

Among lining materials horsehide is still the most reliable as a cover ing It is soft and durable and it can be stretched and molded for con touring Sheepskin which is cheaper and which looks like horsehide, does not wear well Leather of course will darken and become smelly after a while from perspiration this is its main disadvantage

Naugalite * is a new material now being used for linings It is a plastic that is laminated on a knitted fabric It stretches in one direction and can be contoured The plastic top can be washed to clean

PADDING

For padding regular sponge rubber is good but it deteriorates easily and generally must be covered A new padding Rubatex R313V,† is much tougher and does not require any covering over it Latex also provides a good firm padding For gluing on of padding either Pliobond or Elmer s Glue may be used These are available at hardware stores The latter is not waterproof Pliobond is

PLASTIC COATING

Plastic coatings for metal splints may be obtained by using Plastisol If a permanent coat is desired the metal should first be dipped in P X Primer to prevent peeling Before the splint is dipped in Plastisol it is heated for about 10 to 20 minutes in an oven at about 350° F It is then dipped in the Plastisol twice at one-minute intervals After about one half hour when it has stopped dripping it is put back in the oven at 350° for final hardening This provides a very tough covering which does not stain and which does not get sticky under heat

* Made by the U S Rubber Company Another name is Mellowtuft
† Rubatex Division Great American Industries Inc

remains little changed In general, attitude is shaped by past experience and reflects the views of people with whom one has been associated Dorothy Parker s Men seldom make passes at girls who wear glasses" was a quip which reflected the attitude general in her youth that a young woman in glasses was an unattractive sight Attitudes may change, however, as did this one Beginning with the day plastics replaced the silver rims on spectacles and the disfiguring pince nez was abandoned, glasses have become more and more attractive Today there are different colors and decorations, glasses in high style (Venetian masque, cat face) and a variety of shapes designed to be becoming to different types of faces Real glamour was added when Hollywood stars adopted dark glasses

One approach to modifying the public s and the patient s attitudes toward devices is to stress the fact that devices are advances of the mechanical era Indeed if one considers man s dependence upon conveniences such as the electric stove canned foods the automobile and the like everyone who does not take advantage of mechanical equipment is disabled in a sense in today s world Attitudes towards devices are thus points of view, it is important to try to avoid distorted focus

In evaluating a patient s physical need for assistance ordinarily one thinks of individual muscles and joints and thus considers only physiological and anatomical needs for treatment In selecting a device, however, the patient must be evaluated also in terms of the motions and forces involved in the specific activity A razor holder for example, which positions the razor on the dorsum of the hand is eminently more useful to a weak hand than one that is clipped to the palm Such an arrangement utilizes the principle that lifting from beneath is mechanically easier than pulling from above Further if there is supinator weakness, this position aids in supination Finally, with the razor on the dorsum of the hand the distance that it must be lifted to reach the chin is shorter than if it were held in the palm

The force of gravity also, is an important consideration as are the functional factors of the moving parts of a piece of apparatus These may be utilized positively to assist in function or neutralized when they cannot be so harnessed

The mechanical and manufacturing aspects must be examined in considering the availability and utility of devices Materials must be durable and also light in weight the latter is a basic requirement for the arthritic patient The device must be cosmetic and it should be easy to clean by washing or sterilizing For economy it should be relatively easy to manufacture and should hold up with a minimum amount of repair or wear and tear It should be simple to operate so that the

receptive when offered the hope of accomplishing activities independently through self help devices

Age is also a factor to be considered in that the younger patient tends to be more enthusiastic than the older This is probably because the young patient is not so deeply aware of the implication of his disability as is the older person

Diagnosis is important for from it one may know whether to expect a static condition one that will improve or one that will progress Similarly it enables one to anticipate whether muscle imbalance will pose a problem The type of splinting required for example, in quadriparesis that is the result of poliomyelitis is different from that used in traumatic quadriplegia In poliomyelitis because of spotty weakness, one is much more likely to encounter muscle imbalances which will require protection of the weaker muscles On the other hand muscle spasm in the traumatic spinal cord injured may increase the predisposition to deformity and accordingly modify the splinting Similarly, joint destruction in arthritis demands special consideration of measures to protect against further damage as well as those to improve function

Because of these many variables, devices cannot be evaluated in a general way for all patients and all disabilities Broadly however, their applicability can be assessed from three standpoints physical aspects, psychological considerations and mechanical needs

The physical purpose of a device is primarily to compensate for loss of muscle power or of range of motion or to assist in an activity when muscle power is weak or range of motion restricted Further, it may compensate for incoordination or spasticity or substitute for lost body parts The latter pertains mainly to the field of prosthetics but it also applies to severe physical disability where the part is lost functionally though not physically Finally devices may be used to make work easier for people assisting the patient Lifting of the patient for example, may be simplified with a lifting apparatus

The psychological aspect of disability is extremely significant for it is sometimes the most difficult part of the problem to contend with There may be a definite physical problem which can be solved with the psycho logical problem remaining as the stumbling block The most important determining factor is the *interest* of the patient for without it one rarely achieves success His interest of course depends to a large degree on his attitude towards devices and this in turn is influenced by public and sociological attitudes towards them Unfortunately through the centuries sticks canes litters and wheelchairs have like the peg leg come to represent stigmata of illness weakness and disability Even today this

may be inserted a variety of eating and self care utensils (Figure 73) If there is some grasp remaining which may be utilized, the leather hand cuff may be adapted using just the leather pocket (with elastic webbing), the pocket is attached to the under side of a flat piece of metal and two metal finger rings are added to the top side of the metal strip This is called a ring utensil holder

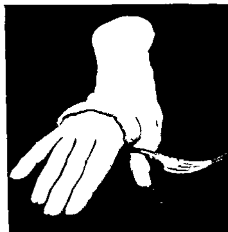


FIGURE 73 Elastic cuff holder for devices

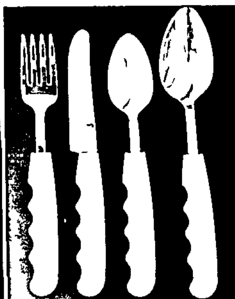


FIGURE 74 Enlarged plastic handles with molded grips

For similar problems, large wooden handles or shaped grips may be used (Figure 74) Sponge rubber to build up a handle is a good substitute but wood or plastic is permanent and more attractive A homemade grip piece can be made from a file handle purchased in a hardware or variety store and attached to the utensil Various utensils with large shaped handles are commercially available in different sizes and at reasonable prices It is usually desirable to have utensils made of aluminum or other light metals to reduce their weight Especially good wooden handles for holding various utensils are now available (Figure 75) These are light in weight have extra size for grasp and may be obtained with pegs which even more effectively compensate for deficiency in grip

When function is impaired by wrist weakness or deformity the problem is one of splinting For supination and pronation one may utilize the technique of reversing the devices with the fork or spoon held above or below the thumb as needed for added assistance If however there is no supination or pronation one may have to resort to mechanical substitutes such as the swivel spoon This has some disadvantages if the bowl is a little too shallow but if food is scooped up with a forward

nuisance factor of the operation does not become so discouraging that the patient will discard it Finally, new devices should be designed not in the fine arts sense but according to sound principles of construction using contour, third dimensional relief, and reinforcement to provide maximum strength with a minimum of weight

APPLICATION OF DEVICES

Eating

In considering the substitution of a self help device for a specific function one should first analyze the normal motions involved in this function or activity and assess the importance and the degree of loss of each of these In eating for example the problem of the arthritic who has lost ability to grasp a utensil is entirely different from that of the patient who with elbow ankylosis has lost excursion of the hand to the mouth

The most important motion in feeding is elbow flexion extension is also necessary but strength in this motion need be only sufficient to assist the flexors in holding against dropping

Second in importance for eating is grasp to enable one to pick up and hold utensils Wrist motion is not important for this function but wrist stabilization is necessary Thus when wrist drop or weakness of the wrist constitutes a part of the patient s eating problem, support for the wrist must be incorporated in the device Supination and pronation of the forearm are used in picking up food and keeping it level while raising it to the mouth Last of all the shoulder is important in so far as stabilization against hyperextension is concerned If the arm is stabilized in a slight degree of shoulder flexion eating can be performed with no motion of the shoulder The reason for this is that in terms of motion and force when the arm is straight down the center of gravity falls within a line running vertically from the shoulder through the center of the arm As soon as the forearm is flexed the center of gravity moves to a position slightly above the forearm and forward of the upper arm (in the lower center of a triangle formed by the shoulder elbow and hand) Unless resisted the shoulder joint will move into a position of hyperextension permitting the center of gravity to fall again into a plumb line Thus even though there is full range or power in the elbow it is impossible to reach the mouth unless there is stabilization at the shoulder against this gravitational force

If grasp has been lost it may be compensated for in several ways The simplest device for this is the leather hand cuff with a pocket into which

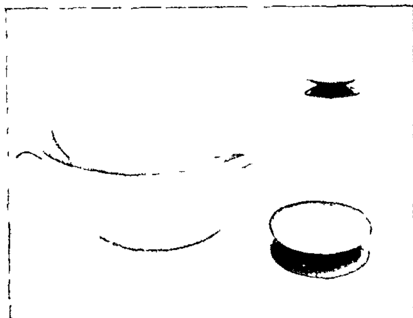


FIGURE 76 Light plastic bowls with suction base

When limitation in motion at the elbow restricts reaching the mouth or face with the hand this deficit may be overcome with long handled utensils or holders (Figure 77) to provide extra length Eating utensils toothbrushes lipsticks, combs washcloths, etc may thus be adapted to this restriction



FIGURE 77 Elongated eating utensils

motion there is usually no problem A substitute simple swivel device may be made by bending the handle of a spoon until it extends up at a right angle, the handle is then attached to the end of a piece of wooden dowel with a screw and wing nut

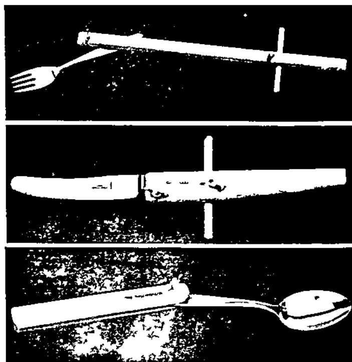


FIGURE 75 Enlarged and pegged wooden handles for easier grip

When stabilization of dishes is needed suction cup bowl dishes (Figure 76) may be used, or small suction cups bought from a stationery store may be placed on the bottom of the dish If need be one can substitute a wet washcloth underneath the dish for immediate use

Sometimes a patient cannot pick up a glass in any manner In such cases a long straw is needed to reach the mouth with a holder to keep the straw from moving around the edge of the glass or from tipping out of it Sometimes just the use of a tall drinking glass will stabilize the straw Straws about 15 to 16 inches long can be made from plastic tubing which bends easily when heated A holder may be made of aluminum with two ends to clip over the glass and the center part bent around to hold the tubing More simply one may use a bulldog-type paper clip This is clipped to the lip of the glass one of the handle tops is bent towards the inside of the glass and this affords a hole to contain the straw Another method is to use a spring clothespin and add an L-shaped piece of plastic on the inside with a hole drilled for the straw

with suction cups and a lever arm pulls out like a slide or boom The patient is lifted from his chair and swung over onto the seat of the car

Bathing

Self-care activities especially bathing and dressing often present stumbling blocks to be worked with and overcome Patients with involvement of hips and knees may be unable to step over the side of a bathtub This may be bypassed by using a stall shower if the patient can stand for only a few minutes or not at all a stool or chair of suitable height may be placed under the shower A stall shower requires very little space and can be installed at a relatively low cost In addition to those available through plumbing supply companies stall shower units may be bought inexpensively from mail order houses

If the tub is to be used a grab bar may be clamped to the side of the tub to provide support (Figure 80) other types are available (Figure 81) for use while the patient is in the tub For safety every bathtub and shower stall should be equipped with a suction cup rubber mat to prevent slipping and falling If the patient is able to get into the tub but has difficulty in getting up from it the bar shown in Figure 82 is of great assistance

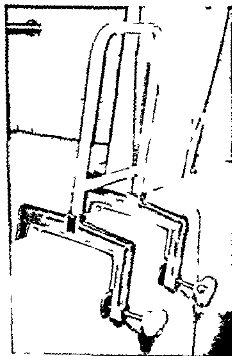


FIGURE 80 Safety grip bar for getting to and from tub



FIGURE 81 Safety grip bar for use while patient is in tub

Needless to say where multiple limitations exist in the upper extremity, many of these devices may have to be combined in a single device to meet the individual s multiple needs

Lifting

For the arthritic patient who is mostly confined to bed one of the devices that may be helpful is the electrically operated Gatch bed Although this is commonly referred to as a cardiac bed it is undesirable to limit it by this name since its usefulness applies to many disabilities The unit comes attached to a regular Gatch spring which is provided with legs A headboard or footboard can be attached or the unit can be placed within the framework of another bed so that it looks like a standard home bed One model comes equipped with a button which makes it possible also to raise the whole bed higher or to lower it

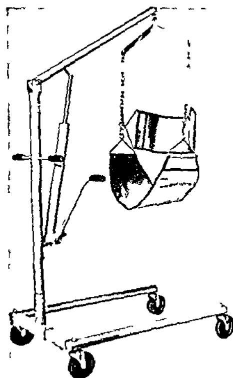


FIGURE 78 Hydraulic lifter for bedside use



FIGURE 79 Hydraulic lifter for automobile

A lifter (Figures 78 79) is another device that is helpful especially for the arthritic patient who must be lifted from bed Several types are available each of which has individual features of advantage Similar devices may be used for transferring patients into bathtubs or into automobiles For the latter purposes the lifter attaches to the top of the car

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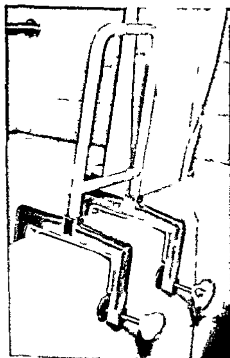


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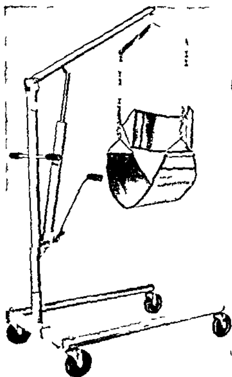


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advantages are its sturdy back support, the wide seat, which is adjustable in height, the fact that it folds and is portable, and the feeling of security which it affords the patient. Its main disadvantage is its tendency to drip water onto the floor.

When the patient cannot transfer to the tub by simpler means, several types of hydraulic bath lifts are available for his use. Most of these require the help of another person, but there is one which the patient can operate unassisted. When the disability is confined to the lower extremities and the arms are strong, the manual model can be used. When, as is more common, there is involvement of the upper extremities as well as the lower, the electrically operated model, in which the seat is raised and lowered by slight pressure on a rubber air bulb, will make independent bathing possible (Figure 85).

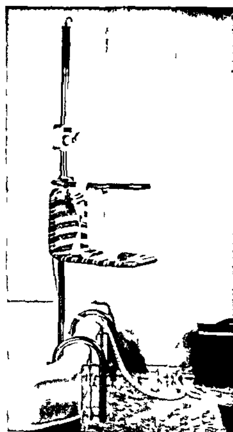


FIGURE 85 Hydraulic bath lift

Many smaller items may simplify the bathing problems of the arthritic. For the person with limited reach, the soap in a mesh bag, the long-handled bath sponge, the washcloth on a handle (Figure 86), replaceable long handled sponge holders, and the "reach all" sponge covering on a stick (Figure 87) can be of help.

Stools for use while bathing must be sturdy well balanced water proof or water resistant and have a nonskid surface That shown in Figure 83 is strongly made and anchors itself to the floor or bottom of the tub by its large suction cups Two stools one in and one outside of the tub, may be used as steps to reduce the amount of hip and knee flexion needed to get into the tub

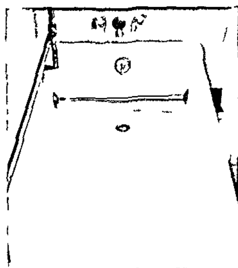


FIGURE 82 Safety grip bar for getting up from tub

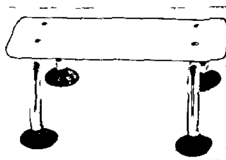


FIGURE 83 Stool for use in bath tub

The stool may also be used as a seat in the tub A cover of terry cloth edged with a casing through which tape or elastic is drawn to fasten the cover securely to the stool provides a comfortable and safe standing or sitting surface Among the many other kinds of bath seats available is that designed especially for the use of the disabled (Figure 84) The

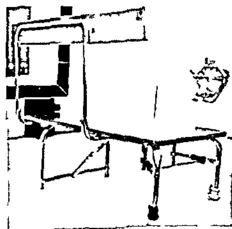


FIGURE 84 Bench for use over tub

advantages are its sturdy back support the wide seat which is adjustable in height the fact that it folds and is portable, and the feeling of security which it affords the patient Its main disadvantage is its tendency to drip water onto the floor

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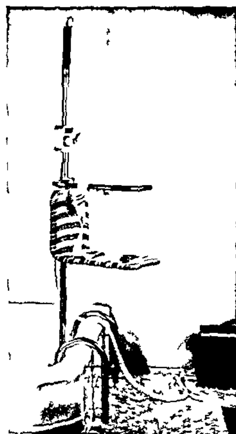


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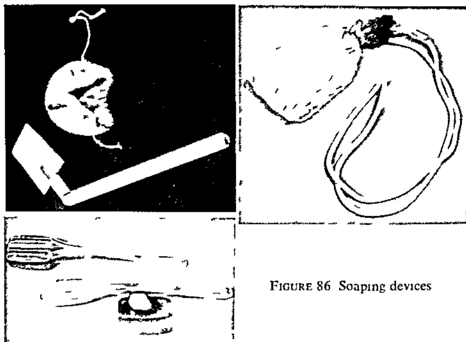


FIGURE 86 Soaping devices

In the search to solve bathing problems safety must always be stressed All stools and bars must be securely fastened and must be tested for strength and stability before the patient is permitted to use them Further, the patient must be closely supervised while becoming accustomed to their use



FIGURE 87 A cellulose Venetian blind cleaner provides an excellent long reach sponge

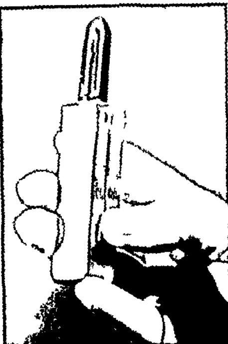



FIGURE 88 Grooming aids

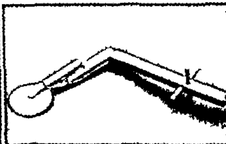
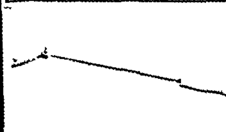




FIGURE 89 Elongated handles for restricted reach

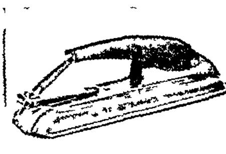



FIGURE 90 Special nail clippers for poor grip

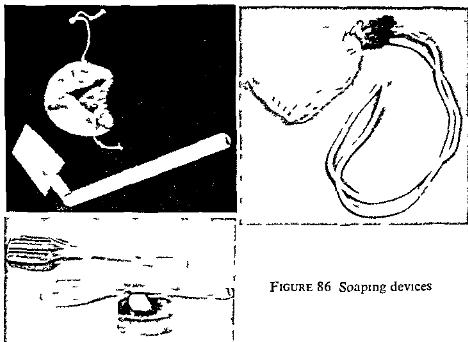


FIGURE 86 Soaping devices

In the search to solve bathing problems, safety must always be stressed All stools and bars must be securely fastened and must be tested for strength and stability before the patient is permitted to use them Further, the patient must be closely supervised while becoming accustomed to their use



FIGURE 87 A cellulose Venetian blind cleaner provides an excellent long reach sponge





FIGURE 92 Tapes dowels with hooks and an elongated shoehorn for getting hose on and off

Of the several special stocking devices commercially available, the Stocking Aid has been of help to most arthritics (Figure 93) The metal and wood form holds the foot of the stocking open and the



FIGURE 93 Special device for putting on stockings

stocking stretched over this form is drawn onto the foot When the foot is completely inserted in the stocking the form is removed and the stocking is drawn up on the leg by the tapes As with many other devices it sometimes takes considerable practice to become proficient in the use

Grooming

Most grooming items are widely available and only a few need be purchased from companies specializing in equipment for the disabled A lipstick which can be operated with one hand, the round the neck mirror (Figure 88), elongated toothbrush handles, and the long handled powder applicator (Figure 89) all have their obvious uses The finger nail clipper with large grips or on a stand (Figure 90) makes this job easier a good toenail clipper for the disabled is still an unsolved need

Dressing

Dressing presents many problems for the disabled arthritic As in other aspects of self care the area of greatest difficulty depends upon the degree and location of restricted motion Putting on hosiery is an especially frequent problem local limitations of motion in the fingers elbows, shoulders knees, hips or spine may create difficulty in performing this single activity and few arthritics are not limited in motion in one or several of these joints A simple device such as a pair of garters on the ends of a length of tape (Figure 91) may provide sufficient help



FIGURE 91 Long pull on tapes for stockings

for pulling on socks or stockings, smooth skin on the feet and closely clipped toenails are essential for this to work Tape loops may be sewn to opposite sides of the top of the sock and two dowels with hooks on the ends may be used to pull them up (Figure 92) When teaching a patient how to put socks on his feet one must not forget to teach him how to take them off again! In most cases a shoehorn on a long handle (Figure 92) is the simplest aid for removing hose This can be used as a pusher inside the stocking until the latter has been pushed down over the heel if the stocking doesn t come off easily it can then be grasped at the toe with a pair of tongs or by a hook pushed through a tape loop sewn to the toe of the hose (Figure 92)

to put on than are knitted undergarments Most arthritics, however, enjoy the warmth of snug fitting knitted wear and prefer it despite the added difficulty A pair of metal kitchen tongs light enough to be comfortably handled, often can be of real assistance here (Figure 95) ridged and sharp ends should be covered with moleskin or sponge rubber to protect the garments but still retain a nonskid surface For the patient whose fingers are strong alligator clamps either on the ends of two dowels or on the ends of a length of tape can be useful in pulling up undergarments slacks shorts trousers or a skirt Necessary reinforcements of hot iron tape may be placed inside the clothing waistbands to minimize the wear and tear of the clamps from pulling The hook in front bra and the elastic topped half slip rather than the full length fitted slip are of great help for the female arthritic who has marked limitation of shoulder and elbow motion If she does not like the half slip, a back-wrap maternity slip may be used backwards This is put on like a coat and is

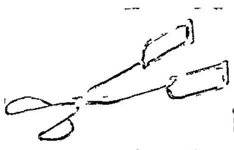


FIGURE 95 Metal kitchen tongs *serve many purposes*

wrapped and fastened in the front When excess fullness is taken out by means of darts it is adaptable to the needs of the arthritic with limited shoulder motion

The careful choice of fabrics is very important in clothing for the disabled Wash and wear materials for example eliminate laborious ironing and by so doing not only reduce the stress on joints but conserve the time formerly spent in ironing for use in more constructive ways Since heavy clothing and bedcoverings are uncomfortable for the arthritic light warm fabrics rather than heavy bulky ones should be chosen For coats and suits milium linings or others with metallic heat reflecting surfaces are better than thick heavy ones Front opening slacks and blouses, front fastening wrap around skirts and front opening dresses are best Fitted armholes and tight sleeves should be avoided in favor of the sleeve cut in one piece with the body of the garment the raglan sleeve or other loosely fitted styles skirts should be flared or fairly full rather than straight or snug

of the ' Stocking Aid, ' but skill and speed develop with practice Stretch hose preferably seamless are easiest to use with the device

For patients who cannot bend to tie their shoelaces, elastic shoelaces are of value They remain tied and with the aid of a long shoehorn the patient can step into and out of even high cut oxfords If he has trouble with the tongue of the shoe creeping down this can be remedied in one of several ways The tongue may be machine stitched to one side of the shoe so that it cannot slide inside the shoe, or a pair of tongs may be used to pull the tongue back into place If these methods are not feasible, a hole may be punched in the shoe tongue and a long shoelace or length of string threaded through the hole, the patient holds the end of the string uses it to pull the shoe tongue into place, and then withdraws the string

Another type of shoe fastening which has proved helpful is the zipper, where the patient cannot reach the foot or cannot get enough leverage to operate the zipper a cup hook on the end of a dowel stick may be hooked through the zipper pull to enable the patient to work it For many people the Shu Lok (Figure 94) is the most satisfactory shoe



FIGURE 94 Hinged shoe fasteners

closure This hinged tongue shoe fastener is opened and closed with a pushing motion which can be effected with a stick or other long handled device when the wearer is unable to reach his feet This closure is also of help to those people who are able to reach their feet but who are unable to manage the fine motions involved in shoe lacing and tying

Hard to get into and hard to fasten underclothing may be bothersome for many arthritics Wide leg panties and undershorts of fabric with ' boxer waistbands and loose leg openings are easier for the disabled



FIGURE 97 Lightweight multipurpose cart

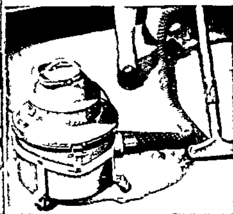


FIGURE 98 Mobile base for vacuum cleaner

A vacuum cleaner with attachments eliminates the need for sweeping and hand dusting of floors and furniture, by confining the collected dust to the container it prevents the settling back of the dust which so often occurs when dusting is done by hand All of the newer vacuum cleaners are on wheels this is of especial help to the arthritic homemaker In selecting a new cleaner it is best to choose one which carries its attachments with it The person who is to use it should test the vacuum for ease of operation and should be sure to try using the motor switch Most of the new cleaners have toe switches to eliminate bending some are of the toggle type which are harder to operate, while others have a broad toe plate switch which is more easily controlled This consideration is of much greater importance than ease of emptying since that can be done by someone else A serviceable old vacuum cleaner may be made more mobile by mounting it on a wheeled base The base shown in Figure 98 is made of elastic webbing and metal strips to which wheeled casters have been attached A wooden or metal dolly of suitable size mounted on freely rolling ball casters also provides easy mobility for a vacuum or a pail of water

Small hard-to manage fastenings should be avoided in favor of large buttons and buttonholes When even these are difficult, the buttons may be sewn on with elastic sewing thread, this permits the button to be turned at right angles to the fabric before being pushed through the hole When small buttons on shirt sleeves or blouses are a problem, French cuffs with expandable cuff links are a help, links are also available (Figure 96) with extendable chains A good substitute may be made at home from two buttons linked by a length of elastic thread this allows the hand to pass through the cuff after it has been buttoned

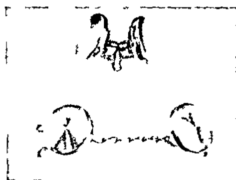


FIGURE 96 Expandable spring cuff links

Homemaking

The arthritic homemaker faces all of the usual problems of the non handicapped homemaker plus those imposed by her disability To adapt and thus continue to carry on in her role as homemaker requires both careful selection of jobs and budgeting of time and energy The judicious planning and rearrangement of the home and its equipment the selection of suitable tasks to be performed and the delegation of others and the use of energy saving devices will all help to make goals realistic and possible of achievement

One important problem the transportation of household equipment, may be solved by making wheels do work thus relieving the housewife Wheeled cleaning carts (Figure 97) are obtainable commercially but a similar one may be improvised from the handle and wheels of a child s stroller that has been discarded The upper tray carries waxes polishes cleaning mitts and cloths while the clips and lower tray support a mop brush and long handled dustpan and floor brush A plastic water pail may be carried in the metal ring midway up the handle The cloth bag fastened to the cart by a plastic apron hoop contains a large paper bag into which wastebaskets and ash trays can be emptied as the cart is wheeled from room to room

A service cart (Figure 99) is another useful and versatile piece of wheeled equipment It may be used to move table setting materials and food from the kitchen to the dining area and after the meal for clearing the table in one trip It can transport clean laundry to storage areas and move other weighty and bulky household equipment from one room to another The cart will support considerable weight and people who need slight support to help them maintain balance can obtain this from the cart as they push it about The cart may be bought with drop leaves which increase the working surface at one height and thus reduce bending needs Wheeled carts which are individually constructed (Figure 100) have an advantage in that they can have a pull out lapboard adjustable to different heights and suitable for various sit down activities

Reaching

Among the problems of the arthritic who is unable to bend because of a hip or spine involvement or who is confined to a wheelchair, is his inability to reach dropped objects or others out of his range Many kinds of reachers have been developed for this need The factors of length and weight size and type of jaw opening handgrasp required and cost should all be considered as well as the use to which the reacher will be put

Wooden reachers are light in weight and available in two main designs The scissors type (Figure 101) may be bought or made at home,



FIGURE 101 Scissors type of reacher

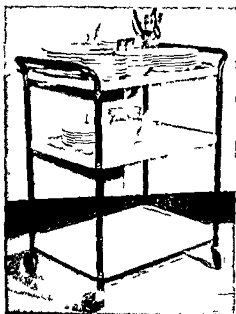
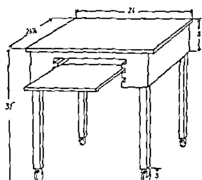


FIGURE 99 Mobile service cart



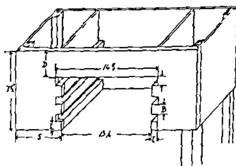


FIGURE 100 Special wheeled cart which may be constructed for home use

Table top is made of ¾ inch plywood

Pull out lapboard is made of ¾ inch plywood and is 16 inches deep and 14½ inches wide This width will go between the arms of a standard wheelchair

These surfaces are finished with water stain and acid resistant finish which is easy to clean The rest of the table is painted

Metal stripping extending ¼ inch above the table surface is attached to all four sides of the table top to prevent items from slipping off

Construction Details (with table top omitted)

Slots for pull out lapboard were made to allow its use at 2 inch intervals 24½ 26½ and 28½ inches from the floor respectively

Lapboard supports are strips of wood nailed to ¼ inch plywood pieces attached to the front and back of the table at the appropriate width

Dimensions

Slots (A) are ⅞ inch
Supports between slots (B) are 1⅛ inches high and (C) ½ inch thick
Distance from top (without table top) to first slot (D) is 1⅜ inches
Last support (from last slot to bottom) (E) is 1 inch

able in two lengths The Swedish 'Gripting (Figure 104) is preferred by some for its lightweight aluminum construction despite the facts that its jaws do not open wide and that its grip on an object will not withstand much pull A lightweight metal reacher with a pistol grip handle is shown in Figure 105 The jaws have a wide opening and the mechanism is relatively easy to operate

ADAPTED FURNITURE

Furniture adaptations for the arthritic are mainly concerned with providing adequate height when limitation of hip flexion makes it difficult to use standard height chairs bed toilets etc The arthritic prefers a firm surface for sitting and sleeping this can be achieved by using a solid bedboard under the mattress or a piece of plywood under the loose cushion of an upholstered chair If a bed is too low it may be raised with blocks of wood under the bed legs (Figure 106) or by placing each leg on a can filled with a weighting material such as sand plaster, clay or cement, the leg can be prevented from sinking into the weighting material by building a fence of four strips of wood across the top of the can to wedge the leg in place



FIGURE 106 Simple method for elevating the bed

A wheeled straight chair or glider (Figure 107) often can be made more comfortable for the arthritic by adding pieces of tubular metal to the bottom of each chair leg above the wheels to provide additional seating height The arthritic who has difficulty in getting on and off a chair of standard height almost always will need a raised toilet seat (Figure 108) These are widely available in several materials and heights and may be removable or permanently bolted in place The bolted seat



FIGURE 102 Clothespin type of reacher



FIGURE 103 Reach EZ E

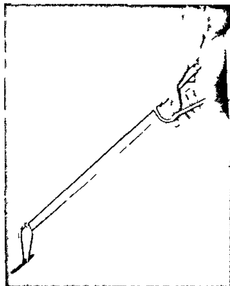


FIGURE 104 Griptang



FIGURE 105 Lightweight metal cable operated stick with large handle and good gripping tongs

a magnet is sometimes attached for use in picking up small metal objects The spring clothespin type of reacher (Figure 102) is made in two lengths, it *is heavier than the scissors type but has a firmer grip, which* is sustained by a spring rather than by manual grasp

Metal reachers vary from the small widely available household tongs to the especially designed Reach EZ-E (Figure 103), which is avail

14

Homemaking Training

Joan B Spencer

A homemaking training program aims to help patients become as self-sufficient as possible in homemaking activities as a part of their total rehabilitation programs

TYPES OF PATIENTS

Most of the patients who can benefit from such a service are women—young women with families who have had full responsibility for care of their homes and families women who have had no experience in homemaking but who must assume at least some of these activities older women who have been homemakers for all of their adult lives and who would like to continue these activities even though their children have grown and dispersed

In a number of instances however referral of men to the service can be beneficial When a man lives alone there will be certain homemaking activities that he must carry out and the man living with relatives may also want to do his share There are many activities which the homebound man whose wife must become the wage earner can carry out in order to lighten her load Many men also enjoy cooking as a hobby and with some training can continue to gain satisfaction from it

The teen ager is another who can benefit from training in homemaking activities Many youngsters with a permanent disability will have an opportunity at some time to carry out some homemaking activities even if this is limited to the care of their own clothing It is important for them to learn methods which will enable them to carry on these activities with the least effort

Patients may also benefit from the service as a vocational evaluation If a handicapped person has worked or is interested in working in an

is more secure and is especially desirable when the additional height needed is greater than 4 inches The wall suspended toilet is an excellent solution to the problem in that it may be mounted at any desired height (Figure 109) T or L bars used with or without safety frames are most useful to the patient (Figure 110)

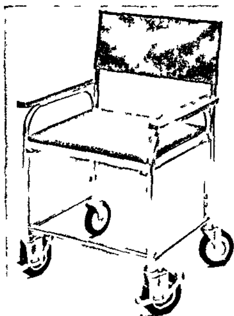


FIGURE 107 Wheeled glide about chair with locking front casters

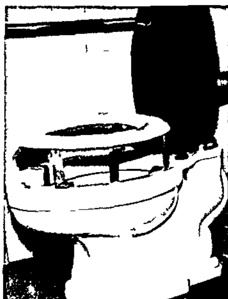


FIGURE 108 Removable raised toilet seat

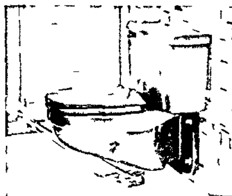


FIGURE 109 A suspended toilet bowl may be mounted at any desired height



FIGURE 110 Safety in transferring with a grab bar

is one now being worked on and taught in colleges, and is not exclusively concerned with the disabled The main idea is to use the head to save feet hands joints, or otherwise bypass limitations imposed by disability Application of these principles by the normal woman means more free time and energy for activities other than homemaking but for the dis abled it often makes the difference between being able or unable to function as a homemaker

Home Management

A definition of home management by Elizabeth Crandall points out the basic philosophy Home management is a mental process for using family or individual resources to achieve family or individual goals" There are a number of key words in this definition which can start a patient thinking in constructive channels The first of these is goals A defining of the role of the homemaker and the needs of the family is necessary before the problems involved in meeting needs can be satisfactorily worked out It is imperative that the family be included in this type of planning and thinking

The second key word in the definition is resources The patient must consider the resources which may be utilized money equipment mate rial possessions, housing family members hired help community resources the knowledge skills interests and attitudes of the people involved their time energy and health etc The normal individual may be limited in any combination of these resources The disabled person however is usually further limited in resources such as skill mobility and energy reserve Careful budgeting therefore of resources is essential in achieving maximum results

The fact that much of homemaking is mental is valuable especially for the severely handicapped Decision making organization and plan ning are thus important contributions that a severely disabled homemaker with a sound mind can still make to assure smooth running of the house hold

Work Simplification

Work simplification is a tool used to help analyze and improve meth ods of work It has been well defined as the organized use of common sense to find easier ways of doing work Many persons use common sense and achieve the results they are seeking but too often homemaking

occupation which involves homemaking activities, his ability in performing these tasks may be tested This information may then be used by the vocational counselor in helping the patient to return to his former occupation, to plan for future training or to develop and investigate other vocational objectives

INTEGRATION OF TRAINING

The homemaking training program must work in close cooperation *with other rehabilitation services—first of all the Social Service Department* The social service worker is often the only link with the patient's family In homemaking activities family understanding and cooperation are of vital importance and having a family member observe the patient in the training setup is very helpful especially if changes in the home situation have been suggested When this is not feasible the social worker must be depended upon for liaison

Activities of daily living are closely linked to homemaking activities, the primary emphasis of both is on the patient's home situation

When special or adapted equipment is required for the patient to carry on homemaking activities the problem may be approached cooperatively with the Self-Help Device Department in testing and adapting gadgets and devices

Frequently there is an overlap of occupational therapy and homemaking activities and cooperation in developing the patient's program is essential Homemaking activities often can be used to provide therapeutic exercises which are more meaningful to the patient than occupational therapy modalities

Roughly patients may be classified according to their limitations into three categories (1) those who need to conserve energy or who because of disability have a lowered energy reserve, (2) those with lower extremity involvement which limits walking and requires their being in a wheelchair or upon crutches or canes and (3) those with upper extremity limitations Any of these categories might apply to the arthritic and in many cases the patient will have involvements classifying him in all three

BASIC PRINCIPLES OF TRAINING

The bases for work with all patients are good home management practices and the principles of work simplification This home economics field

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Work Simplification

Work simplification is a tool used to help analyze and improve methods of work It has been well defined as the organized use of common sense to find easier ways of doing work Many persons use common sense and achieve the results they are seeking but too often homemaking

activities that are regularly repeated become habits and are never consciously recognized as sources of fatigue and wastes of time and energy Using the pattern of analysis of time and motion study may help to overcome this This pattern of analysis has clearly defined steps

(1) *Pick the job to be improved* Experience has shown that when the task is a pet peeve and a definite source of irritation, the homemaker will be more willing to accept a change of methods

(2) *Break the job down into details* This is best done by making a chart and recording the details as the actual task is performed Depending upon the type of job and the extent of disability, this can be a gross study involving movement, equipment and overall operations or a more detailed one if that is necessary to solve the problems presented

(3) *Question the job and each detail* Why is the detail or the job necessary? What purpose does it serve? Where is the best place to do it? This relates to where the materials and equipment are stored the work space available the destination of the finished product and comfort of the worker When is the best time to do it? The sequence of events within the job is checked and also the time of day or day of week the job is done Who is best qualified to do it? Should it be a shared activity or is it one to be done by another member of the family or by hired help? How can the job or the detail be done more easily?

(4) *Work out in writing a better method* Eliminate unnecessary details such as drying dishes ironing household linens, decorating icings Combine details—for example cook and serve in the same utensils, gather the clothes to be washed during the trip to make the beds etc Change (*a*) body position and motions—sit to work instead of standing use less fatiguing and fewer motions (*b*) tools, workplace and equipment—use tools suitable for the job and in good condition, use working areas arranged for a minimum of reaching and bending (*c*) production sequence— get ready should be completed before do it begins (measure dry ingredients for example before liquids to save dishwashing), (*d*) raw material—use prepared mixes frozen foods self polishing wax etc (*e*) finished product—serve baked apples for example as dessert instead of pie

(5) *Put the new method to work* The analysis usually is carried out during the training sessions To be of value the new method must be employed by the homemaker in her own home Unless the patient is aware of the difficulties involved in making a change in work methods she is apt to become discouraged when the new method does not bring

immediate results and she may discard the whole concept of work simplification Since many activities in homemaking are repeated so often that the method employed becomes a well-established habit, time and effort are required in order to break that habit and develop a new one Instead of mechanically going through the task the homemaker may at first have to stop and think or check her written plan as the new method is unfamiliar, this takes time and effort and may make the new method seem much less efficient than the old If she will persist however, during this adjustment period she will reap the rewards of the analysis as the new method becomes a habit

In developing better work methods certain basic principles of work simplification can be of help

(1) Use both hands to work, in opposite and symmetrical motions if possible, with smooth flowing motions in a curved path with no angles (as in dusting and washing windows)

(2) Lay out work areas within normal reach (Figures 111 and 112) Work where the areas of both hands overlap and arrange supplies in a semicircle within easy reach



FIGURE 111 A kitchen work area designed compactly for energy conservation



FIGURE 112 Work surface adjusted to comfortable sitting

(3) Slide don t lift and carry Slide pots for example from the sink to the range Use a wheel table where work surfaces are broken

(4) Have fixed work stations to do each job so that supplies and equipment may always be kept there ready for immediate use (Figure 111)

(5) *Cut down to the fewest elements* Select equipment that may be used for more than one job, eliminate unnecessary motions like smoothing a bed, use recipes that emphasize the one-bowl method and quick mixing

(6) Avoid holding Use utensils that rest firmly (suction cups clamps mixers, etc) so that both hands are free to work

(7) Put gravity to work with laundry chutes, refuse chutes, gravity feed flour and sugar bins, etc

(8) Pre position tools and store them so that they are in the right position to grasp and start work immediately Hang measuring cups and spoons separately within sight store the egg beater so that its handle may be grasped in the left hand without shifting

(9) Locate machine controls and switches within easy reach Select household appliances with the controls located within easy reach for standing or sitting depending on the position to be used Change the location of switches if necessary or insert switches in electric cords

(10) Sit to work wherever possible whether ironing working at the sink preparing vegetables or mixing foods Use a comfortable chair and adjust the workplace height to it if this cannot be changed, fit a chair to the workplace (Figure 112)

(11) Correct the work surface height so that it is right for the woman and for the job Jobs entailing hand activity require a higher work surface than those requiring arm motion or pressure There is no 'standard height since body proportions differ

(12) Improve the general working conditions good light (on the work not in the eyes) good ventilation comfortable clothing pleasing colors, in order to reduce work strain and render the job pleasanter

BODY MECHANICS AND WORKPLACE

Body mechanics workplace and methods of work are interrelated and all play a part in work simplification Maintaining good posture at all times whether sitting or standing assures that the correct muscles will be used in any given activity with the least amount of strain To reduce strain and fatigue a change in position such as alternating standing and sitting tasks or changing hands is helpful Frequent short rest periods are also important in preventing fatigue The homemaker who takes a ten minute rest period each hour will benefit more and be able to accomplish more over a longer period of time than the one who collapses for a half hour at the end of three hours of uninterrupted work

To maintain good posture work heights and storage facilities must be considered and adjusted if possible to the individual Although there is no average person the majority of homemakers must work in kitchens with counters and cabinets of standard dimensions based on averages To ascertain the optimum work height and reach for each patient a series of measurements should be considered (see Chart 1) This is especially important for the arthritic whose disability often limits range of motion and reach and whose degree of involvement is highly individual

I It o Thy i 1 M il i ard P habilit tion
400 E st 4 h Street N Y k 16 N Y

INDIVIDUAL MEASUREMENTS

My h ight ________

Be t h ight for chair ______

	andi g	Stool	Chai o Wh l C air
Ma imum d pth f c unt			
Maximum sef l h ig t ith t unt surf			
Maxi um us ful h ight ro unt			
Maximum useful h ight with l p und unt	X		
N rmal y r ch below unt			
Maxi um re h below u t			
Maxi um re h t low torage ith l p und unte	X		
Mo t omf rt bl h ight f			
G ne l k			
I onl g			
Di hwa hing (bottom f i k)			
Mi ing			

CHART 1

TIME MANAGEMENT

ACTIVITY LIST

D Y			kkL			W NT L			SO L	
or y	ho	me	sk or	ho	me	or ac ty	ho	me	k ac ty	ho

CHART 2

TIME MANAGEMENT

WEEKLY SC E ULE

T	on y	y	d f y	ur y	y	ur y	Sund y
7 9							
1							
12 1 PM							
1 3							
3 PM 5 PM							
5 7							
PM 9 P							
9 P B d							

CHART 3

In taking these measurements it is desirable to have the patient carry *out an actual task The patient will be much more aware of the differ*ence in ease of work at different heights while actually ironing or mixing a cake than she would be if just pushing an iron back and forth or turning an egg beater without resistance Simple adjustments can often be made to achieve the best work height for any given activity by using (1) another surface (2) a wheel table of appropriate height (3) a board across a drawer for a work surface below counter height (4) blocks to elevate the existing surface, or (5) an adjustable ironing board which with a plastic cover can be used for many activities other than ironing

Storage of items necessary for each activity is also important Fixed working stations will prevent unnecessary walking and carrying but there must be adequate storage for the supplies and equipment at each station A good rule is to store items at place of first use ' and it is often valuable to duplicate inexpensive items such as measuring spoons and cups seasonings etc which need to be used regularly at more than one center

There are many ways to improve storage facilities, such as using racks step shelves vertical files peg boards, etc which make it possible to see grasp and remove each item with a minimum of effort Many commercially available inexpensive items will be helpful in improving existing storage *In case there is a handy person in the home many* adjustments can easily be made An excellent source of ideas and information is the Cornell Extension Bulletin No 859 How to Make Cupboard Storage Devices by L Leola Cooper

BUDGETING OF TIME AND ENERGY

The handicapped homemaker is very often limited in time and energy She may not be able to accomplish as much as formerly in a given period of time or because of her limitations some tasks will require more time and effort Organizing her work and budgeting her time will allow her to meet her family s needs and to adjust her place of work so that she will not deplete her energy and strength She should plan when things are to be done (see Charts 2 and 3) beginning of course with those that must be done at specific times such as mealtimes where family members must leave at a certain time to go to work or return to school Then the rest of the day and week is filled in from the list of activities

Guides in Planning a Schedule

(1) Plan to take care of important things first

(2) Schedule tasks so that they will be performed when they are indicated by family requirements

(3) Develop logical sequences

(4) Allow sufficient time for each task

(5) Plan groups of tasks in larger blocks of time on a weekly schedule

(6) Include definite time for rest periods

(7) If rest periods or exercises are prescribed by the physician allot this time high priority

(8) Provide time for planning and household office work

(9) Alternate heavy work with light and spread heavy tasks evenly through the week

(10) Make the plan flexible to take care of unavoidable interruptions and emergencies

(11) Be flexible in following the plan A schedule isn t a race to be won every day

15

Shoes and Shoe Corrections

WILLIAM LOCASCIO

The first function of a shoe is to provide covering for the foot Sec ondly, and equally important it should provide balance 'Balance is the basis for properly fitted and comfortable shoes At times it may be neces sary to apply various types of corrections to achieve balance These are numerous and only those applicable to the arthritis patient can be con sidered here

Corrections do not cure foot pathology but they can provide comfort and correct alignment of the foot for proper weight bearing and posture The latter is important in minimizing the traumatic factors which would further contribute to structural and to functional deterioration of the joints Since the arthritic process is a constantly changing one, adjust ment in shoe corrections is similarly fluctuant

PRINCIPLES OF CORRECTIVE SHOES

A corrective shoe for the arthritic must incorporate strength, balance and comfort in its make up In fitting the shoe special notice must be taken of the fit at the heel and the medial ball of shoe and toe First, the heel must fit snugly Second the first metatarsal head should fit in the pocket of the inner sole at the medial ball of the shoe Third, there should be a ⅜ inch to ½ inch clearance at the anterior toe box of the shoe

The shoe itself must be light in weight and the sole flexible A leather sole is preferred The heel should be of wood covered with cloth or leather to conform with the upper part of the shoe A rubber heel is a must

For the upper part of the shoe suede or vici kid is preferred this supple leather molds itself over the foot thus eliminating pressure on any arthritically deformed toes

For the female patient a low lace oxford provides best support A sturdy steel shank support should be incorporated in the shoe structure and the heel should be of the military or Cuban type Cut out toes or heels heel slings or wedgies are unacceptable under any circumstances since they negate the value of any corrective adjustments To this basic shoe, *shoe corrections may then be added*

Semirigid molded shoes are of no value for the arthritic Although the insoles of the more expensive versions are custom molded the rigid sole construction and the weight of the shoe render it a poor substitute for a balanced therapeutic shoe

SHOE CORRECTIONS

Bars

A metatarsal bar (Figure 113) is a piece of hard leather or Neolite, ¼ inch thick which is placed on the sole of the shoe behind the meta



FIGURE 113 Metatarsal bar

tarsal heads *In such a position the anterior edge of the bar becomes the* weight bearing point thus eliminating pressure from the metatarsal heads It is used to shift weight bearing in such painful metatarsal con-*ditions as metatarsalgia callosities* and rheumatoid synovitis of meta tarsophalangeal joints

A rocker bar is a thick firm piece of leather extending from the toe of the shoe halfway down the shank tapering off posteriorly and anteriorly It is approximately ¼ inch thick under the metatarsal heads

Arthritis involving the first metatarsal head may produce hallux rigidus In such case a long rocker bar applied to the sole of the shoe will eliminate painful motion in this metatarsophalangeal joints

Pads

A stock metatarsal pad (Figure 114) is made of rubber, ⅜ inch thick, and is placed inside the shoe behind the metatarsal heads to shift pressure from these areas To be effective, the pad must be correctly placed if it is improperly placed too far forward it will increase weight bearing pressure on the metatarsal heads and produce greater discomfort

Both the metatarsal bar and the pad are commonly prescribed together with additional corrections such as scaphoid Morton, or longitudinal felt pads

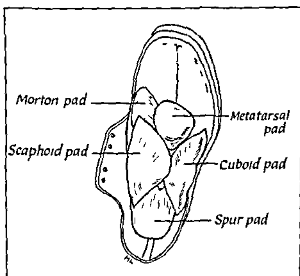


FIGURE 114 Schematic drawing of various corrective shoe pads

A scaphoid pad (Figure 114) is a rubber pad ⅜ inch thick which is tapered to the fascia of the foot Several sizes are available The approximate size required to correct the pronation can be determined by dorsiflexing the foot to its fullest extent In placing the pad in the shoe it is necessary to consider the heel height of the patient s shoe since this will affect the center of weight bearing This pad is especially helpful for pain in the area of the lateral malleolus cuboid or scaphoid and for the pronated foot where the first and second metatarsal heads are malaligned for weight bearing

A Morton pad (Figure 114) is made of rubber 3/16 inch thick and approximately 2 inches long and is similar in shape to a scaphoid pad It is primarily of use in supporting a short first metatarsal The pad is placed under the first metatarsal to equalize weight bearing throughout the transverse arch It is used where there is callus formation under the

second metatarsal and/or when the second toe is longer than the great toe Where there is an enlarged fifth metatarsal a Taylor s bunion a Morton pad is placed behind the fifth metatarsal to relieve pressure on the fifth metatarsal

When a short first metatarsal has produced pronation, a scaphoid pad may be used in conjunction with a Morton pad

The spur heel pad (Figure 114) is made of rubber is approximately 4 inches in length and corresponds in shape to the interior heel cup of the shoe The pad is shaved anteriorly with its center scooped out this relieves pressure beneath the os calcis It is especially useful for patients with heel spurs or painful heels from other causes

It should be remembered that heel pain may result from walking in pronation from wearing improperly fitted shoes, and from sources other than intrinsic heel pathology Relief of symptoms is dependent upon recognizing these causes and remedying them

Wedges

A lateral wedge may be used when the lateral counter of the shoe is depressed The wedge realigns the shoe for normal balance

To correct pronation a medial heel wedge may be prescribed Its height depends upon the degree of pronation Average wedges are scaled from ⅛ inch to ¼ inch

A lateral sole wedge is made of leather and varies in thickness from ⅛ to ⅜ inch It is placed posteriorly under the cuboid and extends forward on the lateral border of the shoe to the tip of the sole This wedge should be used as a filler to balance the foot and allow the distribution of weight to be carried over the metatarsal area of the sole In many cases where it is necessary to insert an arch support interiorly to correct the balance of the foot a lateral sole wedge is used in conjunction with the arch support

A medial sole wedge should be made of leather varying in thickness from ⅛ to ¼ inch depending on need The thickness required is placed medially under the first metatarsal head tapering to zero at the midline of the sole and anterior to the tip of the sole

Thomas Heel

A Thomas heel differs from the ordinary heel in that it is elongated medially and its foremost point extends under the scaphoid It tends to support the scaphoid area and to realign the pronated foot The Thomas heel is frequently standard on orthopedic shoes

Heel Raise

The use of a heel raise is important as a balance where there is tendo achillis shortening In these cases elevation of the heel of the shoe reduces tension on the tendon A heel raise should be tapered from posterior to anterior of the heel allowing the heel to be in line with the ball of the shoe Any drastic change in heel height should be achieved by gradual increases over a period of time Especially in cases of arthritis it should be remembered that increasing heel height shifts a greater work load forward onto the small joints of the foot This should be anticipated and additional corrections made if indicated

Custom Arch Supports

Especially in cases of complex and fixed deformities in which it is impossible to achieve redistribution of weight-bearing through simpler measures it may be desirable to use full length arch support inserts in shoes Stock arch supports are inadequate solutions to these problems, the arch support must be custom fabricated to meet the individual need

In the manufacture of a custom arch support a negative shell is first obtained using plastic plaster or plaster bandages This is used to make a positive mold duplicating the foot which then becomes the model upon which the support is made The support (Figure 115) is usually semiflexible of leather and cork (*not rigid*) It may conform to the contours of the deformed foot thus providing equal distribution of weight bearing or corrections may be incorporated to shift weight from specific areas which may be deformed or otherwise intolerant of bearing weight

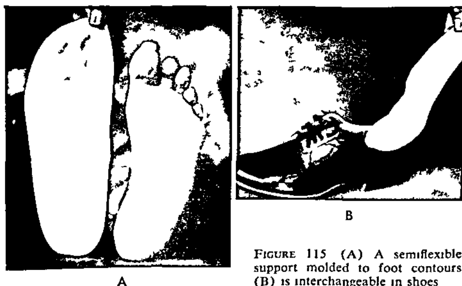


FIGURE 115 (A) A semiflexible support molded to foot contours (B) is interchangeable in shoes

16

General Principles of Physical Medical Treatment

EDWARD W LOWMAN

BASIC RULES OF PHYSICAL MEDICINE IN ARTHRITIS

Purposes (*in order of importance*)

Prevention of joint deformity and muscle atrophy
Protection of joints against additional damage
Reversal of joint deformity and muscle atrophy
Development of efficiency through training and with self help devices to compensate for mechanical limitations
Palliation of pain

Methods

HEAT

Generally is applied for 30 minutes to part or parts to be exercised
Ease of application and extent of body coverage desired are the most pertinent factors in selection of the type of heat
Heat and massage applied locally preceding exercises are valuable as *palliative measures* to facilitate performance of exercises but judicious exercise is the key to successful therapy

AN ADEQUATE EXERCISE PROGRAM

Daily stretching of joints through normal ranges of motion
Repetitions as tolerated by the patient to prevent muscle atrophy
Professional physical therapy usually is neither financially nor geographically feasible Patients should be taught good *home programs* of therapy

THERAPY MUST BE CARRIED OUT DAILY

In *prescribing exercises* remember

Loss of range of motion in a joint starts at the extreme of the range
Exercises must stress forcing into the extremes of ranges of motion if insidious development of deformity is to be prevented
Carrying a joint through one normal range of motion a day will prevent deformity
Patients do not know what the normal ranges of motion of joints are Be specific in prescription of exercises and demonstrate them

Prophylactic exercise objectives prevention of joint deformity and of muscle atrophy *Corrective* exercise objectives reversal of joint deformity and of muscle atrophy

RHEUMATOID ARTHRITIS

Despite newer therapies for rheumatoid arthritis and rheumatoid spondylitis the basic treatment approach is unchanged Rest salicylates a proper diet and physical therapy remain the cornerstones of conservative management and with these measures alone a large percentage of patients fare well and improve It is only when these measures prove inadequate that consideration shifts to chrysotherapy, corticosteroids and other more radical therapies Even when the latter are instituted they are additional to the basic program and not replacements Physical medical measures thus continue to occupy an important place in the treatment programs for both rheumatoid arthritis and rheumatoid spondylitis

Inflammation within involved joints the major pathology of these diseases (see Chapter 3) results in synovial effusion and joint swelling with consequent local pain and muscle spasm This sequence of events may be severe enough to result in gross joint distention and mechanical distortion Because of pain the patient usually protects the involved joint by favoring it As a consequence the joint is predisposed to losing ranges of motions and the para articular muscles to atrophy The objectives of a program of physical therapy are multiple but the most important of these is the prevention of loss of ranges of motion in joints and muscle atrophy Since the primary objective of a physical therapy program is prophylactic treatment must be continued indefinitely so long as the disease process remains an active threat to normal joint mechanics and function The more acute the process the greater the hazard and the more urgent the need for a physical therapy regimen

Physical therapy should be instituted as soon as a diagnosis has been established Even in the acute phase of involvement the joint or joints must be carried through at least one full range of motion a day This is an important consideration despite the fact that pain may necessitate that the joint be immobilized in a resting splint the remainder of the day Indeed, use of the splint emphasizes the need for the daily range of motion stretching In such an acute phase which fortunately is infrequent the patient may be intolerant of any exercise program beyond this measure directed towards preventing the development of joint deformity In the less acute and chronic phases the physical therapy program is directed in addition towards prevention of muscle atrophy through the use of *repetitive exercises If in these phases muscle atrophy and weakness have* already developed therapeutic exercises should be directed towards its reversal

The objectives of a physical therapy program in rheumatoid arthritis are

(1) Analgesia for relief of joint and muscle pain
(2) Maintenance of normal ranges of motion of joints
(3) Maintenance of normal muscle power about joints
(4) Protection of joints against unnecessary wearing

Analgesia is attained through the local application of heat From the patient s subjective standpoint this objective assumes first importance Therapeutically, however the palliation of pain through the application of heat is simply a preliminary to relieve muscle spasm and thus make it possible for the patient to tolerate a definitive exercise program Maintenance of ranges of motion and maintenance of muscle power are the important therapeutic objectives Finally consideration must be given to self help devices energy saving work methods splints braces crutches and other measures directed towards sparing joints avoidable traumas The elimination of traumas protects the joint against additional mechanical damage

As a prophylactic program physical therapy in rheumatoid arthritis is an indefinite one which must be continued so long as the disease persists Because of the long term nature of arthritis, it is usually not feasible economically or geographically for the therapy to be supervised on a daily basis by a professional physical therapist Furthermore the enervating effects of a daily trip to a hospital department for professional physical therapy may positively contraindicate such a plan In most instances it is highly feasible practical and desirable to teach the patient a program of therapy which may be carried out daily at home Such programs can be quite successful and productive

A home program of therapy (see Chapter 7) is best taught the patient by a physical therapist according to the prescription of the physician If the patient is hospitalized for diagnostic studies for initiation of medical therapy or for rest and physical therapy a home program can be taught during this period If the patient is ambulatory he may visit the physical therapist once a week for several instruction treatment sessions At each visit the therapist supervises the patient s treatment program checking especially to see that he is performing his exercise program correctly Once the patient is well indoctrinated he continues the program daily at home with periodic checks thereafter to determine progress and to make appropriate changes

A home program basically consists of heat and therapeutic exercise The type of heat recommended varies with the needs of the individual

patient There is no great therapeutic difference in sources of heat regardless of how complex the apparatus The heating source, therefore should be selected for simplicity economy, and the extent of the joints involved by the arthritis Good cheap sources of heat for home use are luminous heat lamps, or bakers infrared lamps paraffin baths, contrast baths, hot tubs contrast showers, and hot packs (see Chapter 7) For the patient with disseminated joint involvement a baker or a hot tub can be effectively used to heat all joints within a single period of 20 to 30 minutes On the other hand if the feet or wrists alone are affected, contrast baths meet the need excellently

After the preliminary period of heating the patient should carry out his therapeutic exercise program This consists of range of motion exercises to preserve joint mobility and repetitive exercises to maintain or restore power in the muscles mechanizing the affected joints (see Chapters 5 and 6) While heat is applied and range of motion exercises are done, usually only once a day, repetitive exercises are graded in frequency and dosage depending upon the severity of the disease process the tolerance of the patient and the urgency of the need They may thus be prescribed several times daily or, in an acute phase they may be deferred until joint tolerance permits their use

RHEUMATOID SPONDYLITIS

In rheumatoid spondylitis the basic principles of physical medical treatment are the same as in peripheral rheumatoid arthritis except that the objectives of therapeutic exercise are somewhat different While maintenance of ranges of motion of joints is the primary objective in peripheral rheumatoid arthritis in rheumatoid spondylitis the primary emphasis is on deep breathing and upper back exercises This is for the purpose of maintaining erect posture so that if spinal ankylosis ensues it does so with the patient in a favorable upright position The only spinal area wherein efforts are made to maintain ranges of motion is the cervical, this is the last spinal area involved by the disease and functionally is the most vital In addition exercises to maintain maximum flexibility in the hips are prescribed maintenance of this flexibility often can compensate functionally for loss of motion in the lumbar and dorsal regions of the spine (see Chapter 6) In carrying out spondylitis exercises at home patients should measure chest expansion height and finger to floor distance every two weeks The former two are good checks on posture since

any progression of kyphosis will reflect itself in a loss of height and a decrease in chest expansion Similarly finger to floor distance measures hip flexibility Decreases in any of these measurements indicate the need for an increased or revised exercise program

OSTEOARTHRITIS

Osteoarthritis creates a mechanical problem within the joint which it involves The roughened articular surfaces are potential sources of friction, inflammation, pain, and further wearing

The first general principle, therefore, in the physical medical management of the patient with osteoarthritis is *removal of aggravating factors* which may contribute to additional wearing of the joint It is important for an obese person to reduce weight in order to save the joint from trauma imposed by excess weight Specific postural factors may contribute to the wearing of a joint The patient with either congenital or acquired shortening of one leg for example will impose greater stresses on the shorter limb and tend to incur osteoarthritic changes on this side Muscle weaknesses about joints, as in hemiplegia or poliomyelitis favor osteoarthritic changes because of poor joint stabilization and consequent greater liability to joint trauma Scoliosis whether secondary to disease or of idiopathic origin will predispose to osteoarthritic changes Traumatic occupational factors may produce or speed the development of intra articular wearing Recognition of these factors and their removal, insofar as possible are imperative as the primary approach in management of osteoarthritis

In addition to elimination of these abnormal factors of stress it is important also to protect the involved joint against the further wear and tear from usual activity This requires extra *rest* with elimination of as much work especially weight bearing activity from the joint as possible It applies to all spheres of living occupational and other For the wage earner as well as the housewife it is important that attention be given to replanning of the work day and work methods and to use of energy-saving techniques for conservation of joints

Despite careful consideration of aggravating factors the structural integrity of the joint may be so impaired that pain results from the performance of the most necessary activities Pain is the subjective warning that the tolerance of a joint has been exceeded In such cases it may be judicious to further protect the involved joint with energy-saving devices

or appliances such as canes crutches braces or self help devices

At times the excessive overuse of osteoarthritic joints may impose such trauma that acute traumatic synovitis results When this happens it may be wise if not necessary to put the patient at rest in bed until the acute phase has subsided and then permit gradual reambulation with supportive devices such as canes or crutches to prevent recurrence

It should be pointed out that especially with weight bearing joints the instability of one joint may directly contribute to that of a neighboring one Instability of an ankle, for example transmits instability to the knee and thence to the hip and low back In osteoarthritis of the knee, therefore it is of direct importance that ankle instability be avoided insofar as is possible High-heeled shoes wedgies and other types of poorly supporting footgear should be replaced with sensible orthopedic shoes which will afford stability

The second general principle in the physical medical management of the osteoarthritic is *maintenance of joint ranges of motion* Osteoarthritic deterioration of articular surfaces produces irregularity and roughness which in turn is a source of friction when the articular surfaces glide in contact with one another Such friction may result in symptoms ranging from the mildest discomfort to severe pain with hemorrhagic effusion When there is joint pain the patient tends to restrict use of the joint this in turn favors the development of periarticular capsular tightening and of disuse muscle weakness and subsequently may progress to joint deformity Attempts at using such a joint through normal ranges of motion impose a stretch on the tightened capsule which in turn produces pain To prevent this complication of capsular tightness with consequent restricted range of motion of the joint joints involved in the osteoarthritic process must be carried daily through normal ranges of motion to assure maintenance of mobility (see Chapter 5)

The third general principle is *maintenance of normal muscle power* in the muscles mechanizing the involved joint When the articular integrity of the joint is impaired by an arthritic process the greater the stability of the joint the less will be the stress imposed upon the articular surfaces For this reason it is important to build the strength of para articular muscles to a maximum to assure maximum splinting and maximum power The patient usually tends to favor the painful arthritic joint thus permitting disuse atrophy to develop Atrophy in turn tends to produce greater joint instability and pain a vicious cycle Maintenance of muscle

power or restoration through exercises is therefore an indispensable protective measure for the osteoarthritic joint (see Chapter 6)

As in the case of rheumatoid arthritis the patient with osteoarthritis should carry on a home program of physical therapy consisting primarily of exercises designed to prevent loss of ranges of motion and to maintain muscle power about the affected joints Simplicity should be the keynote of the home program This is desirable, not only so that the program may be performed by the patient without the need for assistance but also to assure its being carried out regularly Preceding the exercise program heat may be used for its relaxant and analgesic effects, it is thus a means towards accomplishing the definitive procedure, exercise Exercises, as has been noted above must be of two types those directed towards maintaining normal ranges of motion, and those repetitive in character directed towards maintenance of power

Where the ranges of motion of a joint have become restricted and where muscle weakness has already developed, it becomes necessary to institute a corrective program of therapy In such instances it is essential that the program be carried out by a trained therapist Hopefully the therapist should improve the mobility of the joint through range of motion stretching procedures and should improve para articular muscle power through a graduated program of muscle strengthening Once these are restored to normal the patient may carry on his maintenance exercise regimen at home without need for continued professional therapy

Two anatomical areas commonly involved by osteoarthritis deserve special consideration the cervical spine and the lumbar spine Spurs (osteophytes) tend to develop most often in these locations In most instances however these do not cause symptoms At times if they develop strategically about intervertebral foramens they may impinge upon peripheral nerve roots and cause severe local or referred pain The latter radicular type of pain is the more common When this occurs in the cervical spine physical measures are directed towards relieving the nerve irritation Neck traction is especially effective therapy This may be done using elaborate motorized traction equipment or using a simple two-strap neck harness Since the arthritic change is permanent if not worsening the patient should be taught to carry out neck stretching on his own at home A simple apparatus for this fits over the door (Figure 116) and may be used once or more often each day by the patient at home or at work If muscle spasm has resulted from the nerve irritation heat to obtain muscle relaxation should be applied locally preceding the stretch

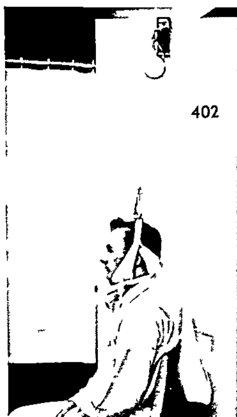


FIGURE 116 Neck traction ap paratus for home use

The stretching separates the cervical vertebrae and in so doing relieves foraminal impingement In addition to traction a cervical collar of felt leather or plastic (Figure 117) may be worn periodically during the day to rest the cervical spine in its job of supporting the cranium

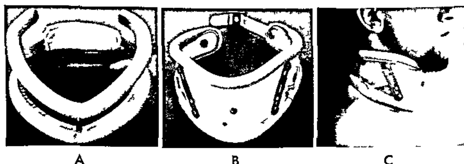


FIGURE 117 Adjustable foam rubber and leather (A) and plastic (B and C) cervical collars

In contrast to osteoarthritis of the cervical spine treatment of similar changes in the lumbar spine is directed towards increasing external sup port Therapeutic exercises therefore are prescribed to increase the power of both the abdominal and back muscles and thus compensate for

the internal structural defect Frequently this alone is sufficient If additional support is needed a stabilizing lumbar corset or brace may be added Traction for the lumbar spine is usually an ineffective procedure as compared with its effectiveness in the cervical region

PSYCHOGENIC RHEUMATISM

Since this is a psychosomatic disorder of the musculoskeletal system, there exists no danger of physical crippling The symptom complex is nonetheless a real one of muscular and skeletal discomfort for the patient and physical therapy can provide considerable though transient relief of discomfort Palliative physiotherapeutic measures of various types of heat massage, and hydrotherapy are valuable for their relaxant effect Any source of heat may be used Choice in the individual case depends upon the desired extent of application the patient s general physical state and his response to particular types of therapy Since physical therapy is totally palliative and an indefinite treatment undertaking the simplest measures possible should be prescribed Usually the simple procedures are as effective as the more intricate and a patient may realize as much benefit from a contrast shower in his own home as from an expensive steam bath in a professional office or at a health spa The patient with some insight thus may be instructed to carry out these measures at home with a minimum of economic burden Professional physical therapy treatment at infrequent intervals but on a maintenance basis may at times be indicated Intensive courses or indefinite periods of physical therapy are best avoided unless finances are of no consideration and the strictly palliative goal is appreciated Relaxation exercises may at times effectively assist in relieving muscle tensions Similarly where real muscle weakness or tightness coexists with the psychosomatic problem the use of reconditioning and stretching exercises together with deep massage may afford a positive approach for some permanent improvement

17

Postural Low Back Pain

HANS KRAUS

Examination of the patient with low back pain by standard methods often results in entirely negative neurologic, orthopedic and radiologic findings Yet the complaints continue and the patient frequently returns with increasing symptoms This large group of patients is often labeled psychosomatic, or at the other extreme they are placed in the categories of more severe orthopedic or neurologic conditions such as instability of the fifth lumbar vertebra or herniated discs If such patients are subjected to a series of tests in which their muscles are examined for weakness and tightness and both muscles and subcutis are examined for tenderness much additional information may be gained A hitherto neglected category muscular or postural low back pain, can thus be diagnosed

By reducing physical muscular activities to a bare minimum todays mechanized life deprives one of exercise necessary to maintain adequate muscular fitness Constant sedentary living shortens back and hamstring muscles and trunk muscles also become weakened by disuse The patient gets along very well with this minimum of muscular equipment until such time as a trivial occurrence forces him to exceed the existing capacity of the muscles Lifting a thirty pound suitcase stooping to pick up a pencil or remaining in a bent position during spring gardening may result in acute muscle strain This may improve by itself or with palliative therapy Such strain reduces the efficiency of the muscles to a still lower level and then another strain occurs Repeated episodes gradually lead to the well known chronic back and finally to a condition which may simulate a serious orthopedic and neurologic affliction

All too frequently this prolonged and repeated suffering ties in with some emotional instability of the patient and finally becomes a well

established illness compromising not only his physical but also his emotional life. At this point it is much more difficult to correct than at an earlier stage.

This muscular deficiency frequently may coexist with more serious pathology such as a disc syndrome or structural deficiency of the lumbosacral spine. Relieving muscle weakness and tenderness often proves most beneficial in these cases and should therefore be attempted whenever possible. The same is true for the osteoarthritic or the Marie-Strümpell spine. Recognizing and treating the muscular aspect of these conditions helps to relieve the symptoms of the patient to a considerable degree.

If one adds up the innumerable working hours lost from trivial back troubles and the large sums spent for hospital and medical care, it is apparent that prevention of this increasingly frequent condition has great importance. Preventive rehabilitation of backache is thus a vital consideration. The problem is growing as the younger generation have less opportunity and less incentive to use their bodies. It is as necessary to evaluate and improve the strength and flexibility of the trunk muscles of children as a preventive measure as it is to take care of their teeth and their vision.

TESTING FOR MUSCLE DEFICIENCY

In addition to the conventional tests the following examination of the back should be carried out.

Palpation of subcutaneous tissues of the entire back, the gluteal area and the lateral aspects of thighs should be performed by picking up a skin fold and pinching it between the thumb and two fingers. Areas of localized inflammation may be identified if this elicits exquisite tenderness or if thickness and coarseness of the subcutaneous tissues are present. Palpation of the muscles along the spine and gluteal area should be done by probing with the tips of the fingers for localized and diffuse deep tenderness.

The patient then should be given the following muscle tests (Figure 118).*

* All figures in this chapter are reproduced from *Principles and Practice of Therapeutic Exercises* by Hans Kraus, M.D. Courtesy of Charles C Thomas.

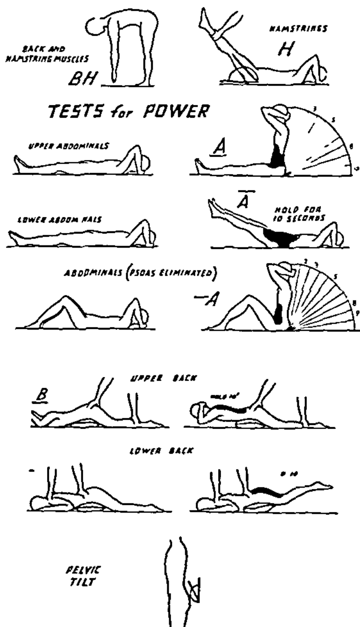


FIGURE 118 Tests for elasticity and muscle power

Abdominal

Position Lying supine hands behind neck Examiner holds feet down on table *Command* Keep hands behind neck roll up towards a sitting position and hold for 10 seconds

Position Lying supine hands behind neck and knees bent Examiner holds feet down on table *Command* Keep hands behind neck roll up towards a sitting position and hold for 10 seconds

Position Supine, with hands behind neck and legs extended *Command* Keep your knees straight and lift feet 10 inches off the table for 10 seconds "

Back

Position Lying prone with pillow under abdomen hands behind neck Examiner holds feet and hips down *Command* Raise shoulders and trunk and hold for 10 seconds '

Position Prone over pillow Examiner holds back and hips *Command* Lift legs up hold for 10 seconds '

Back Hamstring Flexibility

Position Standing erect in stocking or bare feet hands at sides *Command* Put your feet together keep knees straight lean down slowly, see how close you can come to touching the floor with your finger tips

Straight Leg Raising and Lumbosacral and Pelvic Angles

Position Lying on back straight passive leg raising The angle between the leg and the table is measured and should normally be between 80 and 90 degrees The combined length of both hamstrings then is tested by having an assistant raise both legs and by palpating the fifth lumbar vertebra As soon as movement at the lumbosacral joint is noted the angle between the legs and table is measured, the normal angle being 35 degrees These measurements of flexibility should be supplemented by measuring the pelvic angle This is done by holding one arm of a protractor to the plane of the sacrum and the other arm vertical The angle thus measured is normal at 165 degrees

The measurements are recorded as follows A holding power of 10 seconds arbitrarily is considered normal If the upper back and the lower back muscles test normal the former as the numerator and the latter as the denominator would be indicated in an equation $B = \frac{10}{10}$ If, however there was weakness of the upper back muscles with only an 8-second tolerance for the upper back test whereas the lowers scored normal tolerance of 10 seconds this would be scored $B = \frac{8}{10}$, etc

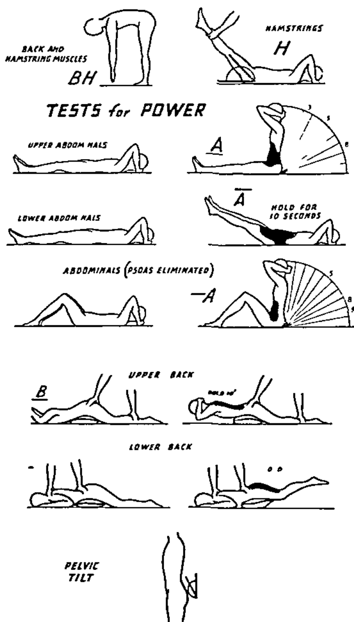


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Position Supine with hands behind neck and legs extended *Command* 'Keep your knees straight and lift feet 10 inches off the table for 10 seconds"

Back

Position Lying prone, with pillow under abdomen hands behind neck Examiner holds feet and hips down *Command* Raise shoulders and trunk and hold for 10 seconds '

Position Prone over pillow Examiner holds back and hips *Command* Lift legs up, hold for 10 seconds

Back Hamstring Flexibility

Position Standing erect in stocking or bare feet hands at sides *Command* Put your feet together, keep knees straight, lean down slowly see how close you can come to touching the floor with your finger tips

Straight Leg Raising and Lumbosacral and Pelvic Angles

Position Lying on back straight passive leg raising The angle between the leg and the table is measured and should normally be between 80 and 90 degrees The combined length of both hamstrings then is tested by having an assistant raise both legs and by palpating the fifth lumbar vertebra As soon as movement at the lumbosacral joint is noted the angle between the legs and table is measured, the normal angle being 35 degrees These measurements of flexibility should be supplemented by measuring the pelvic angle This is done by holding one arm of a protractor to the plane of the sacrum and the other arm vertical The angle thus measured is normal at 165 degrees

The measurements are recorded as follows A holding power of 10 seconds arbitrarily is considered normal If the upper back and the lower back muscles test normal the former as the numerator and the latter as the denominator would be indicated in an equation $B = \frac{10}{10}$ If however there was weakness of the upper back muscles with only an 8-second tolerance for the upper back test whereas the lowers scored normal tolerance of 10 seconds, this would be scored $B = \frac{8}{10}$ etc

The total formula when indicating a normal back would read

$$A = \frac{10}{10} \text{ 10 Abdominals} = \frac{\text{Upper}}{\text{Lower}} \text{ (Psoas eliminated)}$$

$$B = \frac{10}{10} \text{ Back muscles} = \frac{\text{Upper}}{\text{Lower}}$$

$$\text{BH t} = 0 \text{ Back and Hamstring tightness}$$

$$H = \frac{90}{90} \text{ Straight Leg Raising} = \frac{\text{Right}}{\text{Left}}$$

35 Lumbosacral angle
165 Pelvic angle

Thus the formula concisely provides a very simple way of comparing relative muscle strength and back muscles and hamstring flexibility

TREATMENT METHODS

Physical treatment of the muscular deficient back should be pre scribed according to the above classified findings For areas of localized tenderness pinching massage should be given This is usually preceded by 15 to 20 minutes of infrared radiation which ordinarily makes the procedure less disagreeable Trigger points may be injected with a solu tion of 1 per cent procaine or a solution of saline The use of 10 to 20 cc of saline if properly injected into the trigger point, is just as effective as any of various other solutions The exact point of tenderness must be *palpated and marked on the skin and the needle then is inserted* directly into the tender spot Usually the patient indicates spontaneously when the trigger point is hit After experience with injecting trigger points, one learns to locate a trigger point with the needle

Sine waves at times may be used to advantage The indication for this treatment is deep tenderness It is a helpful adjunct especially when used after injection of trigger points If trigger point injection is followed by three to four sessions of sine waves to the injected area reinjection is much less often needed and the result is greatly enhanced

Diffuse deep tenderness of muscle is usually treated with deep knead ing or friction massage

Other supportive therapy may consist of short wave diathermy, especially in patients with moderate pain and relatively great weakness, the

diathermy serves as a warm up In cases of jelling pain (pain at the transition from rest to movement) histamine iontophoresis is prescribed or mecholyl iontophoresis may be used if there is intolerance to histamine

The most important and difficult part of the program is the retraining of weakened or shortened muscles to normal strength and flexibility This is done by gradually increasing exercises which are prescribed according to the deficiencies found

Abdominal strengthening exercises are prescribed for weak abdominal muscles (Figure 119) Psoas strengthening exercises (straight leg raising, in outward rotation supine) are prescribed if psoas weakness is present Back muscle strengthening exercises are given when these muscles are deficient (Figures 120 and 121) Stretching exercises (Figure 122) for back muscles and hamstrings are usually given at a slightly later date if tightness and weakness are combined When tightness however, of back muscles and of hamstrings is the only deficiency present, stretching is given from the beginning, starting with active stretching and followed by passive stretching It is important to precede these stretching exercises by a warm up program and to be careful that the patient actually relaxes before the stretching movement is executed or before a passive stretch is made Stretching a tense muscle does not even touch its reserve of elasticity and is therefore ineffective Exercises should always start with very mild ones and proceed gradually to the more strenuous ones (Figures 119 and 120) this is especially true when the patient shows a marked degree of weakness or stiffness

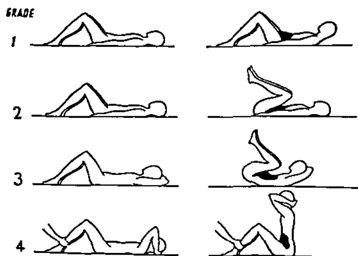


FIGURE 119 Exercises to build abdominal muscle power

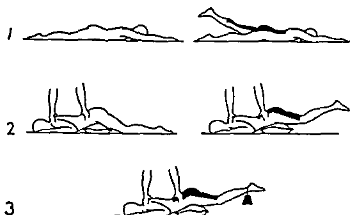


FIGURE 120 Exercises to build lower back muscle power

It is very helpful to write out a number of exercises according to their severity and to teach the patient one or, at most two new exercises at each session Each session should commence with the mildest exercise proceed gradually to the hardest and then return to the mildest exercise again, with the patient performing each movement two or three times and always relaxing between movements This renders the warm up period the work up period, and finally the cool off period automatic in each exercise session Exercises given to the patient should be checked on a chart so that the therapist always know how much of the program has already been given to the patient

The patient who comes for treatment is put through his exercises at least two or three times a week Besides going through an increasingly heavy workout he is given a gradually increased schedule to follow at

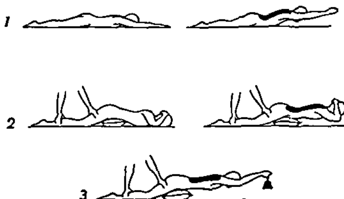


FIGURE 121 Exercises to build upper back muscle power

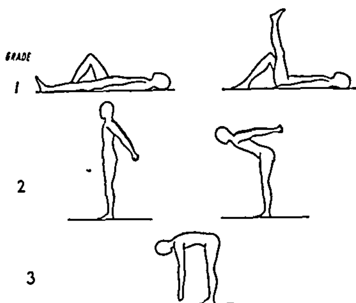


FIGURE 122 Exercises to increase elasticity of hamstrings and back muscles

home Very weak patients may be given a two to three minute program hourly in order to avoid overloading

It is rarely necessary to give assistance to the patient in his movements except for holding his ankles for a sit-up The exercises are increased from very mild to heavy ones, and weights are sometimes used for the exercises if the patient must be prepared for heavy work The principles of gradually increasing the load and of focusing the program on the points of greatest need are always carefully followed

Home exercises wherever possible should supplement two to three clinical sessions These should start with short sessions and be gradually increased to longer sessions up to 30 minutes

Retesting should be done every four to six weeks to determine progress and if desirable to change program In addition to this frequent visits with the patient may be necessary not only for encouragement but to ensure proper progress of his treatment

Supportive bedboards and mattresses are prescribed where needed Supports in the form of corsets less often braces are used only if the patient shows considerable weakness and is forced to continue with heavy physical activity In these cases the weaning from the brace is done step by step the brace never being discarded abruptly The same procedure is true for resumption of normal activities It is always preferable to return the patient gradually to whatever activity he previously followed Routine attention is paid to length of legs necessity for arch supports wedges in the heels etc Working habits and activities outside of work are considered and changed if necessary

THE ACUTE BACK

The acute painful back offers an entirely different problem Here the first objective is to deal with acute painful muscle spasm Painful spasm may develop as acute attacks occurring during the treatment of the chronic back Surface anesthetics especially ethyl chloride spray or procaine iontophoresis, may be used combined with very mild limbering exercises In this procedure the patient is placed on his side with knees slightly flexed Ethyl chloride (Figure 123) is sprayed on the painful

ETHYL CHLORIDE SPRAY
& RELAXING EXERCISES



(TO BE DONE ON THE HOUR) FOR ONE MINUTE

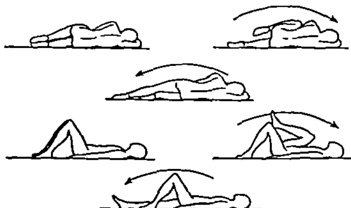


FIGURE 123 Treatment of muscle spasm

area at the same time the patient is asked to pull up his knees to the chest and then gently return to the starting position This movement is repeated three or four times on one side and then on the other The patient indicates the painful area with his finger and the spray follows the shifting pain patterns This treatment is continued for 15 to 20 minutes until pain is relieved as much as is possible The patient is advised to avoid remaining in one position for too long a time He is instructed to perform the simple exercise described above every half hour or in less severe cases every hour for 2 to 3 minutes More severe cases are advised to stay at home but bed rest is avoided if possible and steady alteration of position is advocated None of the muscle tests are done in this acute phase Following the acute phase treatment proceeds as outlined above for the chronic back

18

Rehabilitation of the Arthritic Cripple

EDWARD W LOWMAN

The job of rehabilitating the arthritic cripple is not a simple one Unlike the patient severely disabled from poliomyelitis in whom improvement is to be expected or the patient with transverse myelopathy wherein the disability is a static one, the patient with arthritis is afflicted with a continuing disease process which may worsen Further, in contrast to most other severe disability states, the arthritic patient must contend with pain from his disease The problem is thus a compounded one In the past largely because of inadequate medical therapies, the problem was frequently insoluble In other instances the complexities were viewed with unwarranted negativism With more effective modern medicines the outlook has become decidedly brighter

While the damages from rheumatoid arthritis are primarily in muscles and joints the consequences of the disease ramify into every sphere of the patient s living Its effects are reflected not only in his capacity or incapacity to function physically but in his work performance in his psychological adjustment in the equanimity of his home life, and in other areas In considering therefore his present rehabilitation the physical aspects of the patient s problem constitute only one facet Unless the total patient is evaluated in the light of all the complex ramifications and unless treatment is directed towards all angles the problem will be only partially met and solved The objective in rehabilitation must be the return of the patient to his place in society functioning within the limits of his disability but to the hilt of his capability In the initial evaluation of the patient crippled with rheumatoid arthritis then many kinds of information must be obtained so that a reasonable treatment program may be formulated These may be indicated as follows

REHABILITATION EVALUATION OF THE ARTHRITIC PATIENT

medical history physical examination specialist consultations laboratory examinations	► DIAGNOSIS and PHYSICAL PROGNOSIS
muscle test joint range of motion speech and hearing evaluation activities of daily living	► FUNCTIONAL CAPACITY and POTENTIAL
psychological testing social survey vocational testing	► ECONOMIC POTENTIAL

MEDICAL EVALUATION

Of first importance in the establishment of rehabilitation goals for the arthritic patient is accurate assessment of the type and severity of the arthritic process This requires a detailed history and physical examination laboratory investigations, roentgenologic studies and where necessary the consultative opinions of other specialists Since there are more than a hundred different causes for arthritis the prognoses of which differ a positive categorical diagnosis is imperative before treatment can effectively be undertaken It is significant that one recent study covering 285 persons referred for rehabilitation treatment with a diagnosis of severe rheumatoid arthritis revealed that 24 (or 9 per cent) of these patients did not have the rheumatoid type of arthritis and that an additional 5 per cent had rheumatoid arthritis but were also suffering from other disease processes of considerably graver danger to them than the arthritis Not only is it important that the diagnosis be positively established but the disease process must be assessed in terms of its activity and potential for progression In the case of rheumatoid arthritis which *is usually a progressive process the success of physical and vocational* rehabilitation to a large extent depends upon how adequately this progressive process may be converted into a stabilized one through the use of steroids or other antirheumatic medications

FUNCTIONAL EVALUATION

In addition to medical appraisal of the patient s problem it is essential in the projection of a rehabilitation goal to have other information that may modify overall functional objectives Muscle power must be tested

to identify the extent and location of muscle weakness, this is a standard procedure wherein individual muscles are tested for strength and graded on a special chart originally developed and used for patients with neurogenic muscle weaknesses This evaluation of muscle weakness is an *important determination since joints are of limited use to a patient if* the muscles, which are the mechanizing agents are inadequate to stabilize and mobilize them Further weak muscles about arthritic joints, by their inability to provide adequate stability, predispose to additional intra-articular traumatic damage and resultant additional joint pain

Next the ranges of motion of joints must be measured to determine both the total ranges of motion of joints and the phases of the ranges of motion arcs in which there may be limitation of motion The latter is of considerably more acute significance functionally than the former A knee for example may have an excellent range of motion in flexion of greater than 90 degrees and still be contracted in flexion by a crucial 15 degrees thus seriously hampering the mechanics of weight-bearing and predisposing to additional traumatic degeneration within the knee joints if ambulation is undertaken

Finally, in his functional evaluation the patient is directly tested in the performance of activities Although determination of muscle power and measurement of joint ranges of motion in themselves are valuable data suggestive of functional capacity and potential inferences from them as to *function are not always valid* for in patients with arthritis, pain may be an additional limiting factor Patients are therefore tested directly in the performance of activities considered necessary to self-sufficient living These collectively referred to as activities of daily living include more than a hundred activities ranging from the simplest bed and personal hygiene activities to the most demanding elevation and ambulation activities such as traveling via public transportation (see Chapter 9) The extent of functional impairment is thus directly measured and scored and with the muscle power chart and the range of motion measurements correlation of functional with physical deficiencies can then be assessed This sum total gives an indication not only of deficiencies but also of the physical and functional potentials of the patient towards which treatment may be directed

PSYCHOSOCIAL EVALUATION

Since the effects of arthritis ramify beyond the physical stigmata, the disturbances wrought in the psychological, social, and vocational milieu

REHABILITATION EVALUATION OF THE ARTHRITIC PATIENT

medical history physical examination specialist consultations laboratory examinations	► DIAGNOSIS and PHYSICAL PROGNOSIS
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psychological testing social survey vocational testing	► ECONOMIC POTENTIAL

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FACTORS INFLUENCING REHABILITATION GOALS

Success or failure in the rehabilitation of the severely disabled arthritic can be anticipated with some accuracy in terms of seven major factors (1) medical control of the disease process (2) extent of joint damage, (3) psychological economy of the patient (4) functional training (5) corrective orthopedic surgery (6) applicability of self help devices and (7) vocational and socioeconomic resources The positive and negative aspects of these factors constitute assets and deficits useful not only in determining feasibility of rehabilitation for a patient but also for prognosing the extent of the rehabilitation goal for a particular patient

Medical Control of the Disease Process

It is generally agreed that the best candidate for rehabilitation among rheumatoid arthritic cripples is the patient in whom the disease has become burned out or quiescent In such cases the disease has reached a static level and control of the disease process has become an accomplished fact Disabilities in these instances are of a static nature and the worrisome problem of a continuing disease process progressively worsening the disability is no longer a factor Unfortunately, rheumatoid arthritis which occurs with sufficient intensity to produce severe crippling infrequently goes into a complete remission, or does so only in the very late stages As a consequence it is usually necessary to face the problem of disease activity and accept the need for combining medical therapy with physical rehabilitation measures Furthermore those patients who have reached a crippled stage requiring intensive rehabilitation have usually also been treated unsuccessfully in the course of their disease with the gamut of antirheumatic therapies and require therefore the use of steroids Not only is this more drastic antirheumatic therapy needed for control of the inflammatory disease process but it is usually positively indicated as a protective measure to safeguard against any further loss of function which is already crucially impaired Consequently the effectiveness with which the inflammation of rheumatoid arthritis may be controlled by steroids directly modifies the rehabilitation goal

In the medical management of the chronic rheumatoid patient it must be accepted at the start that *if steroid therapy is initiated it will probably* have to be continued on an indefinite and uninterrupted basis While dosage levels may vary from time to time with fluctuations of the disease process, it will rarely be possible to discontinue medication without a reflaring of the arthritis Although this circumstance is not absolute, it is

must be assessed and in the overall rehabilitation planning positive action towards solution of these intimately related problems must be undertaken Pursuit and solution of minutiae in these areas may prove as acutely decisive for the overall success of the rehabilitation under taking as any of the more obvious medical facets of the case

TREATMENT PROGRAMS

The sum total of all these data—medical, functional and psychosocial —is used to project a rehabilitation goal for the patient and to plan and initiate treatment towards achieving it Goals established initially often are fluid ones which may be changed repeatedly throughout the course of rehabilitation, as dictated by unanticipated changes in the patient s progress

In the case of the rheumatoid patient initiation of medical therapy for the control of the rheumatoid process must precede initiation of a physical rehabilitation program Whether this be salicylates chryso therapy or the more drastic medications such as steroids maintenance levels for their antirheumatic and analgesic benefits should be attained before undertaking the physical program

Physical treatment programs should be intensive covering three to five hours a day five days a week and must be individually prescribed to meet the needs of the particular patient Treatment * might include all or various combinations of physical therapy modalities occupational therapy remedial exercise functional training in activities of daily living training in the use of self help devices, psychological and psychiatric assistance vocational testing and counseling and job retraining The two major cornerstones of treatment objectives are functional independence and protection of joint structures against further structural damage For example manual stretching of a flexion contracted knee might be incorporated in the treatment program at the same time that the patient was being treated with strengthening exercises for quadriceps muscle groups both treatment procedures being directed towards improving joint mechanics and increasing functional proficiency Similarly, stretching of back muscles might be prescribed together with exercises to develop abdominal muscle power essential for sitting up in bed or bending to dress lower extremities Regardless of the area under treatment or the type of treatment employed the objective is the same, to increase function

* See appropriate chapters for detailed discussions

of their impaired nutrition are less tolerant of normal amounts of work and are thus predisposed to wearing. As a result of both of these factors joints are liable to destructive changes which mechanically impair their efficiency. These destructive changes, or secondary hypertrophic arthritis, are the direct or indirect consequence of the inflammatory rheumatoid process. The degree to which they have taken place within the joint will directly modify the mechanical tolerance of the joint for activity. Except for those which may be modified by corrective orthopedic surgical procedures, they are irreversible changes which will impose limitations on a physical rehabilitation goal.

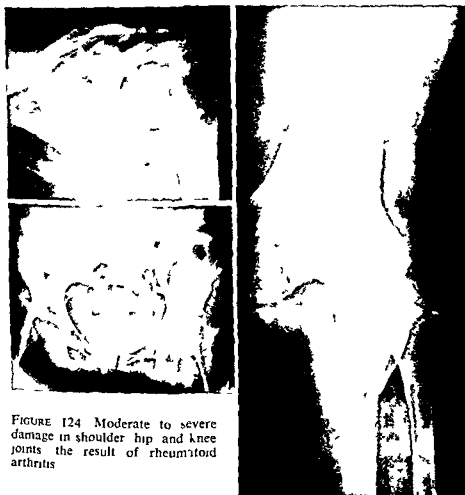


FIGURE 124. Moderate to severe damage in shoulder, hip, and knee joints, the result of rheumatoid arthritis.

It is not always easy to predict the amount of activity that a joint will tolerate. Roentgenograms may be helpful, but they may also, at times, be grossly misleading indices; they are best relied upon only as confirmatory evidence. Often, patients with roentgen evidence of severe intra-

sufficiently categorical to be regarded as a rule of thumb In view of such a premise, it is essential that steroid dosage be maintained as low as possible in order to minimize the danger of troublesome side effects and to avoid trading through excess dosage, the undesirable rheumatoid state for the equally undesirable physiologic state of hyperadrenalism When the intensity of the rheumatoid disease process is such that adequate control cannot be attained through the use of small and recognized safe levels of steroid dosage then it is necessary to accept this partial control rather than risk the complications inherent in higher dose levels In such instances the capacity of the patient to participate in a physical rehabilitation program will be directly modified

In arriving at maintenance levels for the rheumatoid patient, certain facts concerning steroids should be kept in mind While all of the mechanisms of action of steroids are not yet clarified, it is nevertheless established that their anti inflammatory effect is the only beneficial one for the rheumatoid patient It is important, therefore, that dosage be geared to this effect alone and not to pain Since rheumatoid patients suffer pain from mechanical damage within joints as well as from the inflammatory disease process steroid dosage should be regulated *solely* to cover the latter When dosage is progressively increased in an attempt to alleviate the joint discomfort that follows use of mechanically impaired joints, dosage frequently stepladders to much higher levels than would be necessary if the foregoing criterion were adhered to No attempt should be made with steroids to alleviate pain consequent to mechanical damage within joints this is best managed through restriction on activity and through local palliative measures Careful differentiation must be made clinically in identifying these two sources of symptoms and the drug *restricted accordingly if serious hyperadrenal pitfalls are to be avoided* and long term therapy carried out successfully

Extent of Joint Damage

The amount of physical activity that a rheumatoid arthritic joint will tolerate is dependent upon the severity of the inflammation of the rheumatoid process and upon the extent of mechanical damage that has accrued intra articularly It must be remembered that, while inflammatory synovitis is the prominent presenting sign in rheumatoid arthritis the disease process also produces chondritis osteitis and sterile osteomyelitis of the articular structures these predispose to destructive changes in the articular cartilage and bone (Figure 124) Furthermore inflamed joints by virtue

in any other chronic disease This reversion is not due to a predisposing rheumatoid personality," but is directly related in degree to the patient s psychological soundness prior to his illness and to the tempo of the disease process

Since this process of regression to dependency is a slowly cumulative one it is unreasonable to expect that sudden reversal can be quickly effected The opposite is true and the refractoriness of deep seated dependency and passivity may pose the most restrictive factor in accomplishing rehabilitation Success in rehabilitation is largely dependent upon the active participation of the patient in his treatment program *motivation of the patient is therefore essential if goals are to be attained It is* easy to evaluate a patient medically and physically and thus determine feasible goals but unless the patient s goals are in accord with the physician s the divergence in possible and actual results will duplicate the difference in objectives

Functional Training

While muscle power joint range of motion and pain tolerance are valuable indices of the patient s potential functional capacity these are useless unless they can be transposed into function (see Chapter 9) Therapy directed towards increasing power in restricted joints must be prescribed with the projected objectives of putting physical gains to functional use Functional training is thus an integral part of the rehabilitation program and is directed towards training the patient to become maximally independent in those activities essential to self sufficient living Stretching of tight back muscles may be undertaken in physical therapy for example to increase flexibility which may then be utilized in functional training to teach the patient how to bend and dress the lower parts of his body *(Figure 125) Similarly* strengthening of the quadriceps muscle groups may be undertaken to provide muscle strength needed for training the patient to climb stairs (Figure 126) or curbs or to arise from a toilet seat

In every instance function is the ultimate objective In addition to gross function efficiency in function is an objective in functional training The human body as a machine normally functions on a decidedly inefficient level estimated by some to be less than 25 per cent Even in the face of severe disabilities therefore one may be taught to attain a considerably higher degree of efficiency to compensate for irreversible physical deficiencies This may entail months of tedious training and

articular damage will tolerate considerably more strenuous physical activity than others with minimal roentgen evidence of damage Trial therefore, is the most reliable means for determining a patient s tolerance and physical goals should be projected in conformance with the tolerance of his joints It may for example be apparent at the very start of rehabilitation treatment that weight-bearing joints will not tolerate such demanding work as walking and treatment and training accordingly will have to be restricted to self care, bed and wheelchair activities

It should be noted that secondary hypertrophic changes in joints of the lower extremities are considerably more restrictive than comparable changes in the upper extremities Goals therefore, in terms of self care and other self sufficiency activities, may be aimed much higher in the face of upper extremity damage than in the face of lower extremity damage of comparable degree This is because lower extremities are primarily work horses while upper extremities are mainly concerned with activities involving dexterity and agility and are not weight bearing

Both limitation of range of motion of a joint and muscle weakness about the joint may appreciably modify the tolerance of the joint for activity and thus compound the problem already created by destructive articular changes Capsular and tendinous tightness about a joint particularly if it is a weight bearing joint may impose mechanical stresses not only productive of pain but predisposing to even greater articular destruction Similarly weakness of muscles about a joint jeopardizes the stability of the joint thus inviting additional trauma in retraining with consequent further destruction within the joint The degree to which joint tightness may be stretched to normal mobility and to mechanically good weight bearing positions and the degree to which muscle strength may be restored about the joint are vital determinants of the work tolerance and efficiency of joints

Psychological Economy of the Patient

More than any other factor the psychological economy (see Chapter 23) of the rheumatoid arthritic patient is a major force in determining success or failure in attainment of rehabilitation goals In the course of a progressive disease such as rheumatoid arthritis, accompanied as it is by mounting disability and a fluctuating but constant pain the psyche suffers from the constancy the hopelessness and the frustration to which it is subjected The result is an exhaustion of psychological economy and a reversion to passivity and dependency frequently to a degree unequaled

Corrective Orthopedic Surgery

The advent of steroids and other medical therapies for the better control of the inflammatory aspect of rheumatoid arthritis has meant that physicians no longer feel that arthritic patients should wait for their disease to reach a burned out or quiescent phase before offering themselves for corrective surgical procedures (see Chapter 19) It has been clearly shown that such procedures can be undertaken during the active disease phase with success Furthermore from a standpoint of protection of joints against unnecessary mechanical wearing corrective surgical procedures are at times urgently indicated For example, patients with knee flexion contractures should not be permitted to ambulate in this mechanically disastrous position at the risk of superimposing marked structural damage when such deformities can be surgically corrected by capsulotomies It should be emphasized that success in this type of corrective orthopedic surgery is not solely dependent upon the quality of surgical technique as important if not more so are the diligence of the physician and the cooperation of the patient in the pre- and post-operative therapeutic program

Applicability of Self Help Devices

Special apparati and devices should be avoided unless they are essential for increasing function or for the protection of already impaired joints In the latter circumstances they may greatly broaden the functional independence of the patient For a full discussion see Chapter 13

Wheelchairs (see Chapter 11) Wheelchairs must be individually prescribed depending upon the needs of the patient As additions to various models which are commercially available there are more than twenty two different attachments which may be prescribed including reclining backs removable arms desk arms elongated brake handles swinging footrests and elevating foot pieces More recently there has been developed the first motorized collapsible wheelchair which is compact serviceable reasonable in price and easily operated The control panel for this chair can be placed within operating range of any patient s deformed upper extremities and the control buttons can easily be managed by even the most distorted and weakened fingers

Crutches (see Chapter 8) Because of the various combinations of joint deformities that may develop in the upper extremities standard axillary crutches often may not suit the needs of the arthritic patient Depending therefore upon the residual function in the upper extremity

practice, but such an approach frequently opens the door to functional independence Such functional training is an important part of a patient s daily treatment program and as he accomplishes proficiency in one sphere, emphasis is then shifted to the next



A

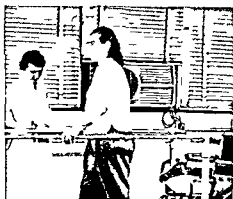


B



C

FIGURE 125 Mobility of the spine (A) is necessary so that the patient may be able (B) to sit up in bed (C) to reach shoes etc



A



B

FIGURE 126 Quadriceps muscle power attained through resistive exercise (see Figure 41 page 81) is converted to functional use (A) in walking and (B) in elevation activities

attendant care or nursing home care will be necessary In most cases the social worker must make one or multiple home visits to give positive assistance in clarifying and solving such problems This sort of attention obviously is time consuming and social workers concerned with problems of the chronically disabled cannot be expected to assume large case loads if their efforts are to be productive The old concept based upon problems of acute illness that one social worker in a clinic setting could handle the population of multiple clinics is now outmoded by chronic disease success in rehabilitation is largely dependent upon awareness of this fact and the establishment of a realistic ratio of social workers to patients Similarly, the psychological complexities and vocational problems consequent to chronic disability are not transient but are residua which must be energetically attacked by psychologists and vocational counselors The adequacy therefore of all of these services is a major factor in reaching the optimum goal for the patient

Job placement of disabled arthritics remains the most difficult objective to attain Limited ability to utilize public transportation to and from work the competitive labor market and the need for specialized placement within the limitations of their disabilities pose restrictive factors in employment These factors are however by no means insoluble if approached positively and with understanding nor do they require sympathy and preferential considerations for solution If the patient s psychological and vocational aptitudes are carefully assessed by the psychologist and vocational counselor in collaboration with the social worker plans for job placement or for suitable job retraining usually can be worked out

The validity of this conclusion is based upon personal experience upon a study by the Division of Vocational Rehabilitation of the State of Georgia and on results of a Back to Work program for arthritics conducted over the past three years by the New York Chapter of the Arthritis and Rheumatism Foundation These experiences especially the last, have shown that with proper management and direction a large majority of unemployed arthritic clients may be returned to a wide variety of jobs in a great diversity of industrial areas Further it has been shown that no aggravation of the underlying disease results nor do pain, emotional factors or physical restrictions interfere with work performance It must be stressed however that testing counseling and placement in employment must be done with intelligent care and patient understanding if the arthritic is to be returned successfully to a productive place in society

joints, crutches must be prescribed or adapted to meet the special needs The types of crutches available are numerous ranging from the standard hand grip type to those permitting elbow weight-bearing

Home Energy Saving Devices (see Chapter 14) The return of the housewife to her household duties is as important an objective, from the standpoint of her personal dignity and her economic productivity, as is the return of the man to his job Careful planning and reliance upon such energy saving devices as work tables on casters, adjustable ironing boards long handled cleaning utensils, lightweight and easily used kitchen equipment can effectively reduce work that otherwise might be placed on her joints in the course of her job as a housekeeper

Vocational and Socioeconomic Resources

The ultimate goal in the rehabilitation of the arthritic of course is the re establishment of the patient in a social and economic environment (see Chapters 22 25) where he may function to the maximum of his capabil ities despite and within the limitations of his disability The attainment of this goal often requires exhaustive resourcefulness and patience

Success in this sphere is directly proportional to two factors (1) the resources of the patient which may be worked with, and (2) the extent of positive assistance afforded the patient by the social worker, the psychologist and the vocational counselor—the latter factor probably outweighing the former in producing the desired results Since chronic disease and disability ramify permanent effects into all spheres of living the need for dynamic and positive assistance in readjustment to these effects is urgent This is in marked contrast to the problem of acute ill-ness which precipitates only a temporary derangement in the socio *economic and vocational areas of living*

For the patient with a chronic disability problem the customary cursory social service is inadequate Detailed inquiry into the family structure and an intimate knowledge of the living and working conditions to be faced by the patient after his discharge from the structured and protective environment of the hospital must be included Apparent minutiae may assume crucial importance in determining the capacity of the patient to function outside the hospital The ability to maneuver six stair steps from house to street may make the difference between ability and inability to travel to a job A doorway of sufficient width to permit passage of a wheelchair or a bed chair or toilet of sufficient height to assure independence in use by the patient, may be the factor determin ing whether the patient can live self sufficiently alone at home or whether

can be arrested it is possible to achieve a complete functional restoration If corrective measures however are not applied promptly the joint usually becomes fixed in a deformed position At this stage of the disease, the physical treatment should consist of (1) protection of the joint from the trauma of use until the edema and effusion have subsided, and (2) the restoration of muscular power and efficiency and the elimination of contractures so that the joint can be controlled atraumatically in a functional position during use Mild contractures at this stage of the disease usually can be eliminated by corrective exercises supplemented in some instances by gentle passive stretching by the patient and the technician (see Chapter 6)

Resting braces or splints may at times be helpful to hold a joint in its functional position at night so that tightness or deformity does not recur during sleep If the tendency for the joint to pull into deformed posture persists operative treatment may be indicated rather than the permanent use of a brace Braces and splints are most useful for the control of the joints of the hands and feet the wrist the ankle the knee, and the lower spine

In subacute and chronic stages of the disease the pathological changes usually are not completely reversible but in most instances satisfactory musculoskeletal function can be preserved or restored by appropriate orthopedic and physical therapy treatment To rehabilitate these patients, one must deal with the destructive effects of the invasion of granulation tissue as well as with the effects of edema and effusion trauma and muscular inefficiency The invasive granulation tissue tends to lyse and replace portions of the synovial membrane joint capsule cartilage tendons muscles and bones Eventually this becomes transformed into mature fibrous scar tissue the compression or stretching of which causes pain

The most characteristic feature of the gross pathological picture of the subacute or chronic stage of rheumatoid arthritis as seen at the operating table is the dense scar which obliterates the intracapsular space and binds together the intracapsular and periarticular structures which normally glide freely on each other during motion of the joint By the time a joint is operated, however its motion usually has become markedly limited and in most instances the articulation has become contracted into a deformed posture with the structures on the flexor side permanently shortened and those on the extensor side permanently overstretched In many instances the articulating bones have become subluxated In the majority of the cases however after the intra articular scar has

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Orthopedic Surgery in Rheumatoid Arthritis

ROBERT L PRESTON *and* LILLIAN SHOTTER

GENERAL CONSIDERATIONS

In considering corrective orthopedic procedures for the patient with rheumatoid arthritis there must be basic understanding of the factors which have contributed directly or indirectly to the development of the *disability*

Disability may be due to one or more of four primary causes (1) pain, (2) muscular inefficiency (3) contractures and limitation of motions and (4) erosion of tendons ligaments or bone

In the early stage of the disease and to a certain extent in any stage pain is caused by effusion and by intra articular and periarticular edema involving the joint synovia tendon sheaths bursae ligaments joint capsule and muscles (see Chapter 3) In addition to the edema which is an integral part of the rheumatoid pathology, edema may also develop in these tissues as the result of trauma

Early in the disease inflammation and swelling in and about the joint may produce pain when the joint is moved This joint pain in turn reflexly results in disuse muscular atrophy Pain also is largely respon sible for the loss of muscular skill which develops soon after the disease invades the joint As a consequence of this weakness and impaired muscular skill the joint may be traumatized on use because it cannot be locked firmly in a functional position when strain is applied As a result of such trauma more edema develops and there is greater pain In the course of this sequence of events it may rapidly become impossible for the patient to move the joint into functional position

At this stage the pathology is reversible and if the disease process

can be arrested it is possible to achieve a complete functional restoration If corrective measures however are not applied promptly the joint usually becomes fixed in a deformed position At this stage of the disease, the physical treatment should consist of (1) protection of the joint from the trauma of use until the edema and effusion have subsided and (2) the restoration of muscular power and efficiency and the elimination of contractures so that the joint can be controlled atraumatically in a functional position during use Mild contractures at this stage of the disease usually can be eliminated by corrective exercises supplemented in some instances by gentle passive stretching by the patient and the technician (see Chapter 6)

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been removed, the bony and cartilaginous elements of the joint are usually in sufficiently good condition to function adequately There may be discrete erosions of the articular surfaces due to the invasion of the granulation tissue A band of scar tissue may extend completely across the joint filling the cavity In advanced cases, portions of the articular surface of the bone may be destroyed, the result either of lysis or of crushing so that the support of the bony framework of the joint is lost

Furthermore the degenerative changes may make the ligaments or tendons so fragile that they rupture when exposed to slight force A patient may notice that one of the hand tendons snaps when he catches a finger in the lining of his coat In most instances however he is not aware of when or how the tendon or ligament gave way It usually is possible on physical examination to determine if ligaments are intact and if they are tight enough to accomplish their function It is not however, always possible to differentiate whether a tendon is ruptured, whether it is adherent at some point so that it is unable to move far enough to activate the joint or whether the muscle is so weak and unskillful that it is unable to move the tendon This is particularly difficult in the evaluation of a severely disabled hand and extensive muscular rehabilitation treatment may be required before it can be determined definitely which of the muscles or tendons are capable of functioning Ruptured tendons or ligaments must always be sutured as they usually are so degenerated that they will not heal with simple immobilization

The rehabilitation of the musculature controlling the joint which has been severely disabled by rheumatoid arthritis for a prolonged period presents an entirely different problem from the early rheumatoid, these muscles are the site of irreversible pathological changes which make impossible the restoration of normal function In addition to the atrophy of the muscle fibers and the loss of skill and strength which are present even in the early cases in the chronic stage of rheumatoid arthritis there is scar in and around the muscles which binds together the elements which normally must shift in relationship to each other during muscular function The individual muscle fibers thus become adherent to each other and the entire muscle tends to become adherent to the adjacent muscles fasciae and bones Such a muscle is incapable of contracting to one half its length as most normal muscles do Even if atrophy is overcome and the more fragile adhesions are stretched out by means of corrective exercise these muscles may still be unable to shorten more

than 25 to 50 per cent on active contraction As a result the tendon remains slack when the muscle belly has contracted maximally and the joint is not locked firmly in functional position during use

In such instances very good joint function may be restored through orthopedic surgery Physiological tension when the joint is in functional position can be restored to the muscle tendon apparatus by moving the insertion of the tendon distally If the tubercle of the tibia for example is surgically displaced distally one-eighth of an inch for each 10 degrees of flexion deformity of the knee the knee will be held in functional position after maximum muscular efficiency has been restored through corrective exercise In operating on the hip the insertions of the gluteus maximus medius and minimus usually must be displaced distally one to one and one-quarter inches to eliminate the laxity of these muscles when the hip is in the functional position for ambulation

In the selection of patients for reconstruction surgery three criteria must be taken into consideration (1) the acuteness of the systemic rheumatoid arthritis (2) the physiological condition of the patient and (3) the psychological condition of the patient As for the activity of the rheumatoid arthritis except when there is a very acute overwhelming rheumatoid involvement the patient should be operated at once it has been demonstrated conclusively that there is little or no change in the local or systemic rheumatoid disease as a result of the surgery In dealing with a disease which so rapidly produces irreparable functional disability one cannot afford to wait for months or years for the systemic disease to become quiescent As for the physiological condition of the patient one must feel sure that he is in sufficiently good condition to withstand the effects of an operation of the magnitude contemplated This criterion is the same for the patient with rheumatoid arthritis as it is for any patient As to the psychological condition of the patient this is a special problem The patient must be sufficiently stable to carry on efficiently the post-operative corrective exercise program for unless this is effective the deformity will recur One must occasionally take a calculated risk but in most instances the patient should be excluded from the surgical rehabilitation program if he does not seem to have at least minimal psychological stability

Each patient should be on a combined treatment program supervised by an internist an orthopedist and a physiatrist If the efforts of all three physicians are carefully correlated it can be expected that the patient will be brought through with reasonably good musculoskeletal function

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of the insertion of the quadriceps All of these procedures do not have to be done on every knee, but in every instance at the completion of the operation, the joint must be stable in functional position and it must have the potential of moving actively into functional position

The replacement prosthesis operation on the hip has been demonstrated to produce the best results of any of the many techniques which have been developed during the past forty to fifty years for arthroplasty of this joint (Figure 128) *In performing this operation on patients with*

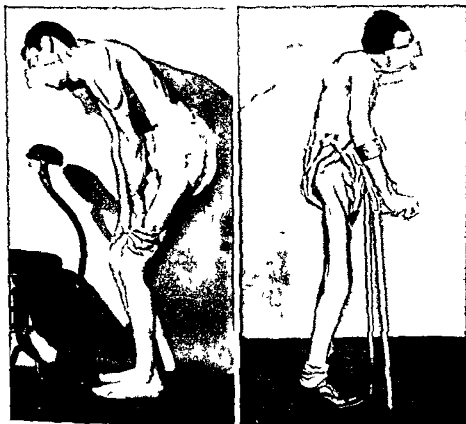


FIGURE 128 Bilateral hip arthroplasty before and after surgery

rheumatoid arthritis the capsule should without exception, be removed as only this and the other *chronically inflamed soft tissues in and around* the joint are capable of producing pain As the inflammatory changes in these tissues are irreversible they will continue permanently to cause pain if not excised

As soon as possible after operation the patient starts corrective exercise to restore the efficiency of the stabilizing musculature of the joint

SURGICAL ASPECTS

Surgical reconstruction must be thorough and must correct all important elements of the pathology if it is not to be a waste of effort The correction of a severe flexion deformity of the knee furnishes a good example of the techniques which are applied in the rehabilitation of many joints (Figure 127) As the first step in this operation the contracted muscles and fasciae on the flexor side of the knee are lengthened The posterior capsule which usually has shortened to about one half of its normal length is then stripped from the femur The anterior compartment of the joint is opened and the intracapsular scar removed so that the bones and the extensor motor apparatus are freed to move



FIGURE 127 Flexion contracted knees before and after capsulotomies

If there is any synovia left in the joint those areas which are chronically inflamed are excised Irregularities of the articular surfaces which would interfere with the free movement of the joint are eliminated, in some instances there is a bony block to motion and considerable bone must be excised If one of the tibial condyles has become so depressed that it cannot furnish adequate support it is elevated and fixed in place with bone grafts Any of the ligaments which are sufficiently lax to interfere with function are tightened or replaced In most instances the slack must be eliminated from the extensor motor apparatus by displacement distally

PRE- AND POST-OPERATIVE EXERCISES

Unlike the average orthopedic patient the rheumatoid arthritic is usually chronically fatigued and has little stamina This must be taken into consideration when planning an exercise program

Before discussing pre- and post-operative exercises for various joints it is well to review the other muscles which need to be strengthened before one is able to get a patient standing and walking Apart from the fact that most rheumatoids have very poor posture the majority of the patients that come to surgery have been in bed or in wheelchairs or otherwise immobile, for a number of years One must therefore immediately start exercises for strengthening the depressors of the shoulders, the extensors of the elbows and wrists and the muscles of the fingers, and for stretching the extensors of the lumbar spine strengthening the abdominals, and maintaining ankle motion especially dorsiflexion of the feet These exercises are done pre and post operatively but as much progress as possible is sought pre-operatively Once surgery has been performed the emphasis shifts to exercises for muscles around the operated joint and the other exercises are fitted into this program

The physical therapist works with the patient twice a day The patient is taught his exercises and is expected to carry them out himself four more times a day The exercises are to be done to the point of pain and fatigue Some patients insist they are completely exhausted after one or two tries and have to be encouraged to do more others are constantly in motion and have to be cautioned that rest as well as exercise is important

Hip Surgery

Pre operative hip cases invariably have flexion deformities with secondary knee flexion contractures If there is no knee deformity which will also need to be corrected surgically the patient starts off with quadriceps setting and graduates as quickly as he can tolerate them to active and resistive knee exercises For the hip flexion deformity the patient is started on stretching for the extensors of the lumbar spine, and on gluteal and abdominal setting If there is a flexion contracture at the hip, it is difficult to teach correct abduction exercises because the gluteus medius and minimus cannot be exercised in this flexed hip position Similarly it is difficult to obtain adequate stretching of the fascia lata which frequently is tight The muscle test often shows a marked difference in the strength of the quadratus lumborum muscles,

The patient and the physical therapist must have a feeling of urgency about the post operative regimen so that the program will move ahead progressively with treatment being given each day, as is appropriate for the situation at that time

The varied orthopedic surgical procedures applicable to the arthritic do not warrant discussion here in any detail Among the more common and most useful however are resection of the head of the radius to improve elbow range capsulotomies at interphalangeal joints for finger deformities metacarpophalangeal reconstruction for correcting ulnar deviation deformity, wrist fixation for flexion deformity of the wrist, metatarsal head resection for hammered toes patellectomy for subpatellar osteoarthritis and spinal osteotomy to correct the kyphotic deformity of rheumatoid spondylitis Some of these are major while others are relatively minor surgical procedures Spinal osteotomy for example is a major surgical procedure yet it may provide the only means of restoring straight posture and therefore be worthy of consideration in many patients even though the results be uncertain

Fusions have been done only rarely during the past few years, for it has been found that satisfactory function with motion and without pain can be restored to most severely disabled joints Moreover when patients have severe disabilities in many of their joints the total end result is better if motion is preserved in as many joints as possible

Manipulation under anesthesia rarely is used this procedure is too traumatic and a deformity usually cannot be corrected completely unless it is very slight Even in the cases in which manipulation with only mild force will correct the deformity it often is more desirable to do an open operation in order to remove intracapsular scar and to restore the motor control of the joint

Unless the deformity of a joint is only very slight and the joint is held in deformed position by only very fragile adhesions or contractures, it is impossible to secure complete correction by the use of wedged casts or traction Furthermore if full correction is not accomplished the deformity will recur In attempting to correct flexion deformities of the knee for example by means of skeletal traction as much as 60 pounds pull usually will fail to eliminate the deformity When wedged casts are used the force to correct the deformity must be applied to the soft tissues of the anterior aspect of the patella and the posterior aspects of the heel and the upper third of the thigh As these soft tissues will tolerate only a limited amount of pressure it is impossible by this means to exert sufficient strain on the knee to correct a rigidly fixed deformity

As a general rule the patient is permitted to stand when the extensors and abductors of the hip have reached a *fair* grade If a patient is extremely slow in reaching this point he may be permitted to stand earlier if he can maintain his hip at 180 degrees of extension and if his abductors do not give Balancing exercises then are taught, and the patient begins to walk using two crutches and doing the three point gait As muscle power improves and the operated hip tolerates normal weight bearing



FIGURE 130 Ability to balance on the operated extremity is a prerequisite to walking without supports

he graduates to two canes and then to one When the patient is able to balance on the leg of the operated side with the knee locked in full extension and with the trunk in functional position and can walk for a reasonable amount of time without going into an abductor gait he is permitted to discard the cane (Figure 130) Until he is able to perform this exercise it is not safe to discharge the patient from supervision by either the hospital or an outside agency

that on the side of the involved hip being stronger and shorter than that on the other side Exercises are given for strengthening the weaker quadratus

Following surgery on the hip, the majority of patients are put in Wilkie boots with the legs abducted about 30 degrees

Post operatively the patient within a few days, starts gluteal abdominal and quadriceps settings, slowly and gradually increasing their strength and number At the same time he is taught abduction setting being instructed to first tighten the gluteus maximus muscles and then to attempt to push his legs outward against the casts

In ten days the boots are bivalved Except when exercising the patient keeps his feet in the boots Active flexion extension and abduction of the hip are started with gravity eliminated, using the powder board and skates Adduction exercises are added later the patient adducts his thigh by means of a bandage tied to the knee which he pulls on with his hand, but he is warned against adducting his thigh beyond the midline The

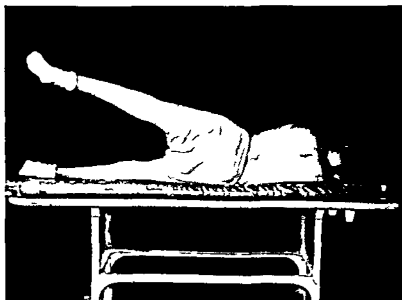


FIGURE 129 Antigravity abduction exercise after hip arthroplasty

program is gradually increased to exercises against gravity and then on to resistive exercises (Figure 129) Pulleys are used by the patient to increase range of motion Internal and external rotation of the hip are added later in the program Initiation of these exercises depends on the surgical approach which was used generally however, gentle rotation exercises are started about three weeks post-operatively

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Knee Surgery

When starting pre operative exercises for the knee, one must remember that hip flexion contractures invariably occur with flexed knees Pre operatively therefore besides quadriceps exercises the hip flexors must be stretched and the patient must do gluteal setting as well as active hip extension exercises When the hips can be extended to 180 degrees, active hip abduction exercises are begun When possible one seeks to develop maximum strength of the hip muscles before operation

Following operation while the patient is in the cast quadriceps, gluteal and abdominal setting exercises are started and gradually increased The cast is usually removed in seven to ten days and Buck s extension with 10 pounds of weight is applied The patient remains then in traction except when exercising until he has good control of the knee extensors The post operative exercises for the knee follow the usual graduated routine of active extension against gravity and resistance At first no emphasis is placed on active flexion the patient sits on the side of the bed and allows only gravity to bend the knee When the quadriceps however are *fair* in power active flexion of the knee is started and, if necessary the patient is taught how to increase flexion by stretching his own knee No attempt is made to get more than 100 degrees of flexion

The major exercise effort is directed towards building powerful knee extensors which will provide stability When the power of the quadriceps is *fair* or *fair minus* and the patient is able to stand with the knee locked in extension he is given crutches and walking is started He may not discard these assistive devices until he can walk for a reasonable length of time locking each knee in extension with each step

Hand Surgery

Because rheumatoid arthritis is especially prone to involve the joints of the hands these parts are predisposed to deformities When a rheumatoid arthritic has had a flare up the finger joints may be so distended with fluid that the ligaments become lax and the joints are left so loose that they are an easy prey for muscle contractures The type of hand deformity resulting from rheumatoid arthritis varies according to the set of muscles predominating in the contracture The most common deformity is that caused by contracture of the intrinsic muscles with hyper extension of the proximal interphalangeal joints and flexion of the distal interphalangeal joints (Figure 131) Another is the long extensor con tractures with the metacarpophalangeal joints hyperextended, the proxi-

mal interphalangeal joints flexed, and the distal interphalangeal joints hyperextended A third type is the long flexor contracture in which the deformity results from contractures of the proximal and distal interphalangeal joints

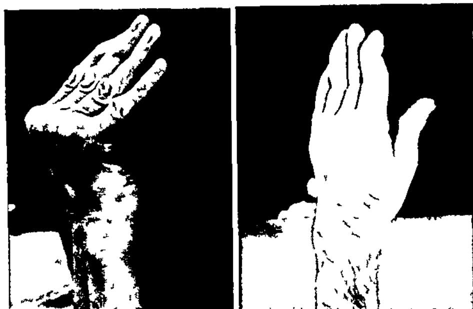


FIGURE 131 Two common types of rheumatoid deformity in the hand

Often, before deformities become apparent one may detect a difference between an arthritic hand and a normal one by asking the patient to open and close his fist The arthritic will close his hand by first flexing at the metacarpophalangeal joints and then flexing the interphalangeal joints he will open it by extending the interphalangeal joints first and then the metacarpophalangeal joint This sequence is the reverse of normal

In deformities due to contractures of the long flexors, capsulotomies of the proximal interphalangeal joints may be performed Pre operatively the functions of the lumbricals and of the long finger extensors are explained to the patient The interossei are passively exercised because the long extensors stabilize the metacarpophalangeal joints so that the lateral motion can take place the patient is not able to work these muscles actively He can work actively however on strengthening the muscles of the thumb, especially the abductors and opponens and the extensors of the wrist After surgery emphasis is concentrated on the long finger extensors When the patient is able to get fairly good extension he starts

active exercises for the interossei followed by exercises for the lumbricals and the remaining muscles of the hand and wrist

In a deformity due to contracture of the intrinsic muscles capsulotomies at the proximal interphalangeal joints may be performed to correct the hyperextension of these joints Pre operatively, the metacarpophalangeal joints are stretched and active exercises for the long finger extensors are started The action of the flexor sublimis is explained to the patient, and assistive exercises are given for the few degrees that the joint can be moved into flexion Exercises for the thumb and wrist should also be done

Post operatively, emphasis is shifted to strengthening the flexor sublimis and increasing the range of motion of the proximal interphalangeal joints stretching of the metacarpophalangeal joints is continued as well as exercises for all other muscles of the hand fingers and wrist

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Role of the Visiting Nurse for the Homebound Arthritic

ENRICA NICHOLSON

Since 1953 a special program for homebound arthritis patients has been in operation at the Visiting Nurse Association of Brooklyn Prior to this time arthritis patients had received only supportive nursing care such as bed baths by a nurse once or twice a week upon the request of a physician Under the auspices of the Arthritis and Rheumatism Foundation the agency undertook a survey to find out what additionally the public health nurse as well as the public health physical therapist might offer the homebound arthritis patient and on the basis of the survey s findings the home service to arthritis patients was expanded to meet their greater needs

A physical therapist of the Visiting Nurse Association now goes into the home to see each arthritis patient after referral She makes a preliminary evaluation of the patient s physical ability and develops from it an exercise program or a program of training in activities of daily living She then contacts the private referring doctor or agency by letter for approval of the program When approval has been obtained the physical therapist demonstrates to the public health nurse the program she wishes carried out Follow up visits are made by the physical therapist as needed for supervision of the public health nurse or for re evaluation of the patient s status Thus public health nurses participating in the program make it possible to extend the scarce services of the public health physical therapists At the same time, direction of a positive program kindles in the nurses new interest in the troublesome chronic arthritic

Most patients despite age and disability show interest in the program offered and respond with enthusiasm The volume of patients in clinics

and hospitals makes it impossible for each to be given much time, thus the visiting nurse is in an enviable position because the patient looks forward to her visit

During her visit the nurse therapist often is able to correct miscon ceptions that patients or their families may have Persons with long term illness commonly are victims of fads which are supposed to relieve their conditions The patient, for example may have heard from the man around the corner that drinking cabbage juice will help arthritis This misconception can be corrected by outlining a good basic diet

The home visiting program has another major value in that it helps to secure family participation in the care of the patient The success of the program basically depends upon getting the members of the family interested so that they understand the purposes of the various procedures and the need for giving assistance to the patient only when it is necessary Such instruction allays fears and develops efficiency, and the overall result is closer to the optimum for the family as well as the patient

The nurse physical therapist in the home, also may suggest environ mental changes that are desirable or necessary This may be no more than *rearrangement of a kitchen cabinet so that a housewife can reach certain* objects from a wheelchair or raising a toilet seat or changing the height of a bed so that the patient can manage without assistance Though seemingly small these changes are important when they make the difference between dependence and the patient s being able to manage by himself

The public health nurse brings further advantage to the patient through on the spot recognition of the need for referral to outside agencies Due to the very nature of her work she is aware of the facilities in the community that exist to help the patient seeing the need in the home she can effectively help to bring the two together The nurse for example, upon encountering a patient aged 45 to 50 years in his home, might find that he could do some work if no more than homework or piece work In such an instance contacting a vocational counselor would assist in obtaining an evaluation training and perhaps ultimately a job for the patient

Many times the patient s local physician is not aware of facilities such as an arthritis clinic that may be used if the patient needs more intensive help The nurse can inform the doctor of such a facility and the doctor may then refer his patient to it for more complete work up and recommendations

In setting up an exercise or Activities of Daily Living program at home, the goals must be realistic. The objective may be a simple one such as motivating a 70 year-old man to do a certain type of exercise which will prepare him eventually to travel to the corner store for tobacco. Further, the goal must be one that the patient can attain. With the housewife, the therapist may stress the performance of those exercises which will make it possible for her to do more towards the care of her family. For example, she may set as her goal the combing of her youngster's hair, ironing, cooking, or even housecleaning.

The program should always be adjusted so that the patient can see that he or she is making progress. Once a patient has reached maximum benefit, it is important to help him realize that he has reached maximum and that he must learn to live within his limitations.

OTHER INFORMATION ABOUT THE VISITING NURSE ASSOCIATION

Q. Is it only the medically indigent patient who is serviced?

A. No. Any type of patient who requests service receives it whether he can afford it or not.

Q. Is service free?

A. There is a fee for those who can afford to pay. Service is free for those who cannot afford a fee. For some the fee is adjusted to their ability to pay.

Q. Who makes the referrals?

A. Referrals may come from private physicians, from hospital clinics or from specialized centers concerned with the care and rehabilitation of the disabled. They come also through home care programs of hospitals for patients who are not completely well but sufficiently well to go home. Referrals may even come from neighbors.

Q. When a patient is referred by a neighbor, does the nurse make an initial visit before finding out who the physician is?

A. The physician's name is obtained before making a visit if this is possible. If this is not possible, policy regarding medical supervision is explained at the time of the first visit. If the patient is eligible for care, the physician is then contacted by telephone and requested to submit an "Interagency Referral Form."

Q Are referrals made from industries?

A Occasionally Contracts with industries however, are usually for short term care and only occasionally for patients with conditions involving arthritis

Q When a privately referred patient has reached maximum benefit but the doctor wishes treatment continued, how is this managed?

A This may be difficult A note, however, is sent to the doctor thanking him for his appreciation of the service and including a resumé of agency policy regarding the program It may be agreed to reduce service to once a month for perhaps six months before completely discontinuing service A nurse cannot continue, however, to see patients indefinitely

Q Are nursing duties mixed with physical therapy duties?

A Yes A nurse averages eight or more visits every day In the morning she may see someone with grippe In the afternoon she may see a patient who has a hemiplegia or one with arthritis and perhaps several mothers with new babies In the two categories with orthopedic implications she would be doing physical therapy while in the others she would be giving only nursing care

Q How long will the agency care for a patient?

A This depends somewhat on the policies of the local agency If the patient is a cerebral palsy youngster, who is mentally deficient he may be carried for six months if no improvement is noted after six months visits are discontinued If the patient has had poliomyelitis he may be treated for as long as two years

Q What happens to a referral from a private doctor who requests a physical therapist for a particular child three or four times a week when the staff is restricted and can go in only two times a month?

A The referral is taken but in discussing it with the physician an effort is made to help him understand the staffing problem Usually the doctor accepts this explanation even though it may be agreed that more service would be desirable

Q Is transportation for the therapist supplied by the agency?

A Yes in agency cars

Q Would treatment be carried on three times weekly for a six month period if the family could be taught to carry on?

A Definitely not The quicker a family can take over the better

Q Is there an in service program?

A The physical therapy consultant conducts classes on rehabilitation procedures for new staff nurses and classes are held in rehabilitation technique and Activities of Daily Living Consultant service for the public health nurses is also considered a part of the in service training programs

Q Who determines the financial status of the patient?

A It is up to the nurse to determine whether the patient can pay full fee part fee or nothing It is felt that she is best qualified to do this since she visits in the home sees the situation and can discuss the financial aspects with the patient

Q What is the history of the agency?

A The Visiting Nurse Association of Brooklyn has been in existence since 1888 A group of public-spirited citizens thirteen to be exact met with the purpose of organizing a society to teach persons of all classes how to give instruction in home nursing and in the laws of health It has since evolved into a 135 nurse agency which provides skilled nursing care to patients of all ages under medical supervision in their homes At present teaching is also conducted for prospective parents Nurse physical therapists give massage and muscle re-education and teach rehabilitation procedures in the home The organization operates under a Board of Directors with an Executive Committee and various standing committees to implement the actions of the Board of Directors The Medical Advisory Committee approves all standing orders medical procedures and medications which may be given

Consultants in nutrition maternity and physical therapy are available to assist supervisors staff and patients when necessary Eight offices in various sections of Brooklyn are staffed with individual supervisors and public health nurses

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Mobile Physical Therapy Units

R W LAMONT-HAVERS

Mobile physical therapy units mean different things to different people In general however, the task of a mobile unit is to provide service to homebound patients in order that they may become more self sufficient There are many ways by which such service can be rendered Each community in fact must modify the basic concept to meet its own needs and circumstances In each case the existing services within the community are utilized to the utmost and the mobile unit is integrated with them as much as possible

THE BASIC MOBILE PHYSICAL THERAPY UNIT

The basic mobile unit consists of a physical therapist with a car and a small amount of essential equipment The car need not be elaborate or large While many units have station wagons or panel trucks many very successful units operate using small English cars

The car needs to carry very little more than the therapist The primary task of the therapist is to teach the patients how best they can help themselves by a regular regime of exercises, and not to give complicated treatment such as short-wave diathermy which is very evanescent in effect To this end only a limited amount of equipment needs to be carried

BASIC ESSENTIALS FOR A MOBILE PHYSICAL THERAPY UNIT

Physical therapist
Automobile
Portable infrared lamp
Hydrocollator packs
Knee boards
DeLorme boot and weights
Simple leg traction apparatus

The infrared lamp and Hydrocollator packs are used as a source of *heat at the time of the therapist's visit in order that the exercises may* be performed more efficiently The patient, generally is expected to apply heat before the therapist arrives Portable whirlpool baths have *generally not proved very useful Similarly, so called portable short wave* or ultrasonic machines are not recommended, they are heavy and their effectiveness usually does not compensate for their trouble

*Of value are such things as pulleys weights Sayre slings, and adjust*able crutches for demonstration to a patient of what can be fixed up for him A box of sand in the car is of value for making sandbag weights *for patients*

Referral of Patients

Every patient must be referred by a physician The services rendered by the mobile unit form but one part of the total integrated medical program The patient remains under the supervision of the referring doctor whether he is *in private practice or in* a *hospital* outpatient clinic

The doctor refers the patient by sending in a requisition form Besides the usual data regarding the patient s name diagnosis etc , there should be a space for other conditions from which the patient is suffering such as heart disease, diabetes etc , which might contraindicate certain types of exercise

While there should be a space for treatment required this should not be elaborate or contain a list of many procedures to be checked off It is well to remember that most physicians have had little training in prescribing physical therapy and the therapist should expect to encounter such instruction as the usual Generally a talk with the physician by telephone will prove of value both to him and the therapist Once a service is offered physicians will gradually learn to use it more efficiently

Although in theory it would seem logical that all patients should be assessed by a physiatrist, this has not usually proved to be very successful Physicians in practice frequently do not appreciate having their patients assessed by other physicians unless they have specifically requested it Furthermore the shortage of physiatrists usually makes assessment impractical if not impossible A physician should be kept informed of his patient s progress by a written report at least every three months Treatment should not be continued beyond three months unless further instructions are received from the physician

The functions of the mobile unit are always under the medical super-

vision of the Medical and Scientific Committee of the local Arthritis and Rheumatism Foundation chapter or other organization The therapist is responsible to this committee and seeks advice from it on medical problems

Patients

Only homebound patients are accepted by the unit 'Homebound should not be interpreted literally but should include patients in nursing homes long term hospitals, and other places where physical therapy facilities are not available Some of these patients will be bedbound while others will be housebound because of lack of adequate means of transportation No matter how severe the handicap the aim for the patient should be for improved self care and eventual ability to go to a treatment center for a more adequate rehabilitation program

Patients suffering from arthritis are usually sick patients with an active disease they are thus unlike patients with poliomyelitis and paraplegia who reach a stage of being well patients with fixed handicaps Thus in dealing with patients with arthritis, particularly those who are homebound one must have patience tenacity, and perseverance Treatment and supervision often must extend over several months before improvement is seen The therapist must expect frequent setbacks and disappointments and the patient himself must be prepared to carry out some sort of regimen for years In spite of these limitations a great deal can be done toward returning these people to useful lives

The actual types of arthritis which are treated will vary with the community In some only patients with rheumatoid arthritis are accepted In most areas however all arthritic and rheumatic diseases are treated including the mesenchyme diseases degenerative arthritis for which much can be done and the nonarticular rheumatism group Thus all age groups from childhood to old age may be encountered

The successful treatment of an arthritic patient involves a great deal more than attending to a sore knee or a crippled hand It is imperative that the patient be considered and treated as a whole as well as with specific exercises For this reason the therapist must be concerned with some of the social and environmental aspects of the patient s condition and these should be discussed if necessary with the physician Frequently the Arthritis and Rheumatism Foundation and its auxiliaries will be of help in obtaining equipment such as self help devices or wheel chairs transportation and other necessities

Fees

One of the prime purposes of the mobile unit is to assist physicians in providing adequate care for their patients. There are few patients who can afford the prolonged type of program required. In most units, it has not been found practicable to have each patient investigated by a social worker, nor is such a procedure especially desirable. In general it has been found satisfactory for each patient to set the figure which he believes that he is able to pay. He is told the cost of the treatments $3.00 to $5.00, as the case may be, and asked to pay as much of this as he can.

VARIATIONS OF THE PHYSICAL THERAPY MOBILE UNIT

The Fixed Treatment Center

This type of unit (Figure 132) is particularly applicable to areas in which there are several small communities. A small treatment center is established in the hospital or public health building of each community. The therapist, working out of the largest and most centrally located community, then visits the centers in the other communities at set times, usually on a weekly basis. When it is possible, the physician refers his patients to be seen by the therapist at the treatment center. In this way the therapist can care for many more patients in a given period of time. Home visits, however, are made in each community when necessary.

SUGGESTED EQUIPMENT FOR THE FIXED TREATMENT CENTER

Inductotherm or Short wave
Standard infrared lamp
Baker
Paraffin wax bath
Guthrie Smith apparatus
Neck traction
DeLorme boot and weights
Three exercise tables
Self help devices

The Use of Other Agencies

In some areas a physical therapist cannot be employed full time for the mobile unit. Under these circumstances, arrangements are frequently made with a hospital or rehabilitation center physical therapy department to utilize one of their therapists part time. In other areas, agencies

such as the Visiting Nurse Association are subsidized to carry on this work A variation of this practice is the use of the Visiting Nurse Association for uncomplicated homebound cases while a mobile unit with an especially trained therapist cares for the more difficult cases

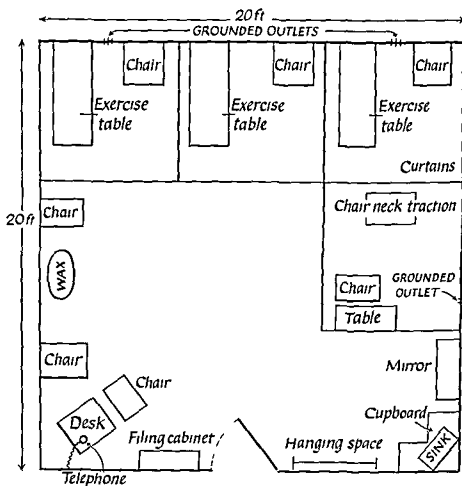


FIGURE 132 Plan of typical physical therapy treatment room (one physical therapist)

OTHER TYPES OF MOBILE UNITS

There are other types of mobile home care units than those devoted to physical therapy Some of the most successful are those providing the services of an occupational therapist or a special nursing care The occupational therapist plans the patients activities and environment to make them more functional The nurse does not give bedside nursing care but is trained to apply resting splints collect blood samples and carry out other such procedures Such units can be extremely valuable

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Social Problems of the Arthritic

Jeanette A Margolies

Any illness makes an impact on the patient and his family but the effect of a chronic illness is markedly severe With a chronic illness like arthritis the accompanying social economic and psychological problems are sometimes as serious and as difficult to solve as the medical problems of pain and disability With arthritis there is much uncertainty about the future The often capricious and unpredictable course of the disease causes great anxiety The disease is painful it may cripple, and it is long drawn-out and costly Further as with other chronic diseases the problems are fluctuant They change and develop with the progress of the disease and its resulting disability

To examine the social problems stemming from arthritis and to explore ways in which some of these problems might be solved both to make the patient s arthritis more bearable and to prevent his social and economic deterioration the New York Chapter of the Arthritis and Rheumatism Foundation initiated a two year study in 1953 A trained social worker undertook this survey in two New York City arthritis clinics one in a municipal and the other in a voluntary hospital She talked with the clinic doctors and social workers and interviewed a total of 125 arthritis patients She got the patients cooperation for these interviews by explaining the purpose of the project to them as they waited in the clinic Because her approach was sensitive she was able to elicit frank and full comments from the patients as they told how arthritis had affected their lives and their families The social worker gave the patients a great deal of freedom as to the matters they discussed which they associated with their arthritis These included not only economic questions but also the many social and psychological problems which complicate and restrict the life of the chronic arthritis patient

ending in hospital outpatient departments In other words as the family s savings become progressively exhausted during the course of the disease, the economic status becomes permanently lowered A distinguished physician has stated that only people in the top 10 per cent income bracket can afford the expenses resulting from a chronic disease like arthritis without a drastic curtailment of the family economy

Among the women who had been responsible for running their homes before the onset of arthritis 27 of the 65 included in the survey were performing all their household duties at the time of the study (most of these 27 were osteoarthritics the rheumatoids were much more seriously handicapped) 25 others performed limited duties, while 9 could only do the minimum and 4 could do nothing around the house

Socially 71 per cent of the adult patients had had to limit or make marked changes in their recreational activities after the onset of arthritis Sensitive about their handicaps some became timid socially, the pain others suffered reduced their drive toward social activities

The effect of arthritis on family relationships both marital and those between parents and children was also studied In broaching this sub ject the social worker talked with each patient for only an hour or so, letting him choose his subject and initiate discussion of family relation ships if he wished rather than probing this point It is thus noteworthy that 60 of the 116 adults commented on their family situations Of these 60 32 reported a good marital adjustment before arthritis 28 had expe- rienced marital discord prior to illness Two thirds of the originally well adjusted group or 22 persons reported no significant change in their marital relationship after the onset of arthritis, while 8 said that some serious problems had developed in one case this had led to separa tion Of the 28 patients with marital problems antedating illness 15 reported no significant change 12 reported increased marital difficulty, including 5 separations while 1 patient reported an improved rela- tion

In summary social problems affect arthritis and arthritis affects the social situation If a woman is in pain worries about the cost of her illness and is unable because of arthritis to do her usual housework she is likely to suffer a good deal of tension which may in turn aggravate her arthritis Similarly a man subject to frequent pain may find it difficult to consider objectively his physician s suggestion that he train for a new occupation and may thus delay or even prevent his medically feasible vocational rehabilitation In addition therefore to the physical conse- quences of arthritis the psychological and social effects of the disease

and their impact upon the medical picture must be kept constantly in mind Skilled social work is needed by many arthritis patients if their problems are to be satisfactorily resolved

THE NEED FOR SOCIAL WORKERS

By broad definition social work is the art of helping people to deal with the problems emotional or environmental, which arise in their life situations The social worker has two chief tools The first is her skill in using the personal relationship with the patient in an objective fashion The second is her knowledge of community resources and her training in how to use them in her patient s behalf Her job is to achieve a free, warm, and considerate relationship with the patient and to use it consciously as a professional tool to further the patient s welfare

Unfortunately social work like physical therapy suffers from a personnel shortage Medical social workers often find themselves performing inadequate roles because the physician is unfamiliar with the broad gamut of constructive services which may be obtained by utilizing social service appropriately Hence the profession is not attracting enough able candidates Moreover the scope and limits of medical social work are difficult to define The temptation is to assume too much or too little because the demarcations between the duties of the family agency the doctor and the medical social worker are often not clear

As a result of its survey the New York Chapter of the Arthritis and Rheumatism Foundation concluded that more social work was needed in arthritis clinics To demonstrate and to study what full time professional social service could do the Chapter agreed to assign two social workers for two years of full time service in the two arthritis clinics where the original survey was conducted This project is current

Careful records are being maintained on the needs of all patients the services rendered significant changes in the patient social work time required for a full clinic load the workers contacts with doctors nurses and physical therapists the community resources available and those needed etc

In addition to serving the patients it is anticipated that the project will help clinic physicians obtain through actual experience a clearer picture of the social worker s role and how she reinforces the patient s medical care It is hoped that the project ultimately will lead to greatly expanded social service for arthritis as well as other chronic disease clinics

These were two of the earliest studies and although, in certain respects, they come closer to currently acceptable research practices than other reported studies, they nonetheless failed to insure a sufficiently large sample of rheumatoids and matched controls, or they employed a composite population of rheumatoids, osteoarthritics and other types of arthritics so that no definite conclusions may be drawn from their findings Peculiarly, these early investigations did not lead to any further research for about ten years Many medical papers expressed the conviction however that there were emotional problems or character traits that were related to the illness These did not all describe the same emotional distress or trauma, but the consistency with which emotional factors were mentioned suggested an implicit broad agreement on the relationship between emotion and rheumatoid arthritis

From an objective point of view serious reservations must be retained about this causative relationship Invariably the rheumatoid arthritic is seen after the onset of illness, and the frequently progressive crippling nature of the disease despite all forms of physical and chemical treatment, fosters the seemingly hopeless conclusion that emotional factors difficult to comprehend and more difficult to treat must have caused the illness To date no one has demonstrated the ability to predict which individuals facing a difficult emotional situation will develop rheumatoid arthritis and which of a different emotional make up, will not develop the illness On the other hand the frequency with which different investigators over the past twenty five years have reported generally similar observations of emotionally predisposing characteristics and traumas should not be discounted but should stimulate definitive studies on the relationship between emotion and rheumatoid arthritis

In the past several years there has been an increased interest in the psychosomatic illnesses The question whether rheumatoid arthritis is one of these has been investigated and a number of hypotheses regarding the relationship between emotional factors and the illness have been postulated Three such investigations have received considerable attention

Johnson and others reported the psychoanalytical treatment of a group of 25 women with varying degrees of severity of rheumatoid arthritis They concluded that these women were chronically hostile individuals who resented and envied men but at the same time had unusually strong needs to serve other people Because of a somewhat complicated emotional life pattern observed in these women the authors believed that rheumatoid arthritis was a reaction to certain types of serious frustration

Life History Data from Patients

The 50 patients ranged in age from 15 to 65 years and for purposes of evaluation were divided into two groups, the moderately disabled and the severely disabled Roughly half the patients were in each group The average age of the moderately disabled group was 42 years whereas the severely disabled averaged 46 years The moderately disabled had been ill for an average of six years the severely disabled for a period of eleven years This correlation of longevity with degree of disability was to be expected because rheumatoid arthritis is a progressively crippling illness and severe disability infrequently develops except over a number of years

The social worker interviewed each patient and obtained as complete a life history as could be taken under the circumstances It was noted that the distribution of religious affiliations among the patients was different from what might be expected from the New York City population A sampling study however to determine whether this distribution was similar to or different from that among the rest of the hospital population showed the distributions to be identical

There were twice as many women as men which is similar to the sex distribution frequently reported in the literature and something one may expect in working with rheumatoids The men more frequently had rheumatoid spondylitis whereas the women were primarily diagnosed as rheumatoid arthritis In this report these diagnostic categories are combined since many medical authorities question whether a true distinction exists between these diagnostic entities

One of the most striking facts uncovered was that about 50 per cent of the patients lost or were separated from a parent before the age of twelve years and for a duration of at least one year If they lost a parent there was no foster parent or stepparent replacement for that year Separations from parents endured for longer than one year In giving his life history the patient often did not report this significant event In several cases it was disclosed tangentially and only after the social worker had known the patient for a considerable period of time Once alerted to this frequency of occurrence the interviewers re examined their data for gaps in continuity and in these cases sought further data revealing additional separations

The second fact which became obvious after a short time was that few of the patients had affectionate loving parents They grew up instead in rather cold impassive or actually rejecting kinds of environments

This was additional to the fact that they may not have had a parent, that is, if a parent had died and was not replaced, this was not considered as a lack of a loving and affectionate parent

A large number of patients remained close to their primary family unit parents siblings or a foster parent, until after the age of 30, having been unable, for some reason, to separate themselves from it In American culture, the usual pattern is for the man, at a relatively later age, and the woman at a relatively younger age, to break many ties with the family most often by marriage and with the formation of a new family unit These patients however, remained at the stage of the dependent child Their courtship activities were chronologically delayed rather than prolonged and they married at a late age At the time of admission to the project, only one third of the patients were married and living with their spouse—a very low percentage for a group whose average age was 45 This fact was considered descriptive of their psychosexual development

As reported by other investigators a relatively large percentage of the female patients had been actively interested in physical activities and considered themselves tomboys Two of the men had been unusually competent in sports one the best racer in his public school and the other a nationally known quarter miler

In summary the overall picture of the patients was that of a group who at an early age had suffered emotional trauma through losing or being separated from a parent or through the lack of warm affectionate and protective parents They remained however with their primary family units until comparatively late ages Their courtship relationships were delayed and they did not marry until a relatively late age The percentage of marriages was smaller than in the general population, and among those who did marry there were a large number of divorces and separations representing a basic inability to develop independence and form relationships of a close personal nature with a member of the opposite sex and to establish a family unit It is a most reasonable explanation that people who early in life do not have a stable and warm family life from which to derive satisfaction have less need to establish their own family unit Similarly if they do establish a family unit they will make less of an effort to maintain it and will accept its dissolution with little conflict

Psychosocial Aspects in Treatment

Significant for success in rehabilitation is the establishment of a good relationship between the patient and the therapist Intensive psychotherapy was not part of this study Indeed, most of the patients did not want this since the basic premise of such treatment is awareness and acceptance of an emotional disturbance In all cases but two there was no such acceptance and in these two patients it served as a denial of physical disability through the belief that finding the key to the emotional disorder would undo the irreversible changes in their joints A good relationship permits the therapist to probe more deeply and discuss more frankly the feelings and motives of the patient Although this is not effective for deep characterological disorders and psychotic states it is often decisive, when correctly timed, in milder neurotic reactions

In the treatment of patients one of the most significant considerations is the level of motivation, that is, the patient s drive to get better In working with a patient who is not motivated, there is the risk of developing a frustration which may reflect itself as hostility towards the patient The more clearly this is understood, the better is one able to work with difficult patients

With a considerable measure of support reassurance, guidance and interpretation more than half of the patients made slow progressive improvement As confidence returned they accepted medical recommendations more completely, attended physical therapy more faithfully and developed a more responsible and courageous attitude with regard to returning to the community despite their handicaps An appreciable number obtained employment, despite severe disability and did well socially and financially

With some patients however there was little or no progress One of the difficulties encountered was the secondary gain obtained through the use of illness to control other members of the household In these instances continued helplessness and dependency were essential to the patient s continued control These patients did poorly in rehabilitation

Another condition which blocked successful rehabilitation was extreme dependency Patients who within the hospital had found the security of a home were apt to cling to this security rather than consider a change through participation in a rehabilitation program

Profound depression was another important factor in preventing successful rehabilitation In a number of cases slips accidents, and harmful

patients were considered a very demanding and hostile group of people

The patients relationship with family members was quite poor The members of the family showed no interest and almost never attempted to speak to the staff about the current condition of the patient, what the prognosis was, how long it would take for rehabilitation, or when the patient would come home Some of this indifference might be attributed to the fact that many of the patients had been hospitalized previously and often for prolonged periods of time Yet this should not account for the complete lack of interest so often observed unless there was an estrangement from or hostility towards the patient Social work contact with family members in a number of cases confirmed the existence of serious conflict and hostility towards the patient

A number of patients while in the hospital became involved in open fights with others One woman who had an extremely strong need to serve other people would overwhelm other rheumatoids with her attentiveness She would say I think this would help you or Let me do this for you Even though she was quite seriously disabled, she would hobble over and provide assistance or service This need to serve other people did not spring from a healthy affectionate interest in giving assistance but was an attempt to control them What usually happened was that the other patient became irritated and frustrated and the friendship would terminate in a squabble This happened often enough to be characteristic of a number of the patients

Since these observations were made among hospitalized disabled rheumatoids it is reasonable to question how applicable they may be to the general rheumatoid population especially since many of these patients were obtained through referral If for example, a physician or social worker at a voluntary hospital had a patient who was difficult, demanding and making no progress, he might have felt that referral to the project would relieve him of a problem, particularly since intensive psychosocial services were available on the project He might have explained the potential benefits of the project in a somewhat exaggerated manner and the patient might have become enthusiastic and accepted referral After acceptance and treatment for a while the underlying personality characteristics would become apparent Should such a hypothetical situation have occurred in several cases out of the total of 50 cases accepted it definitely would have biased observations Unfortunately the existence or extent of such referrals could not be determined and observations are thus reported without absolute certainty that the group is a typical sample of moderately and severely disabled rheumatoids

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exertion beyond their physical capacity could all be traced to depression and the need to alleviate guilt by a self damaging act Such patients are 'accident prone

A realistic understanding by the patient of the course and characteristics of rheumatoid arthritis was an important influence on the amount of progress that the patient made Patients entertain all kinds of magical ideas about illness, and almost all live with the hope that some drug will be discovered which will suddenly restore them to their physical condition prior to the onset of illness This is of course impossible for the moderately and severely disabled arthritic patient whose joints are already permanently damaged Many patients cannot accept this because it necessitates readjusting to new conditions altering or lowering goals to realistic levels, and dealing with the emotional and physical problems involved in such readjustment Instead they prefer fantasy solutions If there are indications of such fantasies, it is necessary to encourage their full expression and through a comprehensive discussion of the realistic circumstances of his case to bring the patient back to the realities of his present condition and his future potentialities

The patients in this study who could not face the realities of illness and who thus were unable to benefit from rehabilitation were, by and large the least intelligent ones In the course of rehabilitation patients receive many directions and instructions from the physician physical therapist and others working with them It takes intelligence and imagination for a patient to transpose these directions to situations which are not exactly like the ones discussed with him One may instruct a patient not to walk around too much but unless this is elaborated upon with many specific illustrations the patient may proceed for example to do too much housework and precipitate an exacerbation of the illness In more severe cases of intellectual deficit powers of retention and judgment may be poor so that damaging patterns of behavior may be repeated Such patients require very close supervision

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Occupational Programs for the Homebound Arthritic

MARGARET CLARKE

The person who has a long term illness is unable to carry on the vast majority of the activities which prior to illness made him feel useful and productive The resulting feeling of inadequacy is physically and psychologically damaging to him He needs to develop interests in activities which he is physically capable of engaging in and which at the same time are sufficiently stimulating to serve as substitutes for the *activities which formerly made him feel adequate*

The medical care for the chronically ill patient should include occupational programs designed to help him cultivate such substitute interests Occupational programs are of particular value to the arthritic patient for two reasons First because the arthritic patient s use of his extremities is seriously impaired he often requires special instruction and individualized equipment to carry out many of the movements involved in a given activity Secondly since arthritis does not necessarily shorten the patient s life the waste of human resources is considerable when the patient with this disease does not lead a productive life

Although the value of occupation for persons with long term illnesses is now widely recognized far fewer occupational programs have been developed for patients who are homebound than for patients in hospitals and custodial institutions Yet the homebound person s need for productive activity may be even more pressing than that of the patient in a hospital or institution when the patient lives at home among healthy active people his feeling of uselessness may be reinforced and intensified by comparisons between their productive capacities and his own

The Home Care Department of Montefiore Hospital in New York City has provided occupational programs of one kind or another to its

patients ever since the establishment of Home Care nine years ago The character of the present occupational programs evolved gradually as the result of the Home Care team s experience in incorporating productive activities for the patients in their medical treatment Two occupational programs are now operated by the Home Care Department a recreation and art therapy program and an experimental project in vocational rehabilitation

The Montefiore Home Care Department provides a comprehensive, hospital type of medical care at home to from 80 to 90 indigent patients who are seriously and actively ill with chronic diseases The illnesses of all the Home Care patients are of such severity that they can be maintained at home only with intensive medical care Treatment is provided by a team composed of physicians social workers physical therapists nurses recreation therapists and—a recent addition—vocational rehabilitation workers The philosophy of medical care on which the Montefiore Home Care service is based recognizes that long-term illness almost invariably poses overwhelming social and emotional problems for the patient and that the patient s reactions to these problems directly affect the course of his illness Helping the patient to handle his social and emotional problems therefore is assumed to be an integral part of his medical treatment

The recreation and art therapy programs and the vocational rehabilitation project are specifically concerned with two widely prevalent problems First the majority of the patients desperately need something to do Most of the Home Care patients are people who have struggled for an existence all their lives the men at their jobs the women at keeping house and raising children on marginal incomes The work involved, hard as it may have been was a worth while activity which made the patient feel needed and useful Without assistance in planning, most of these patients find the activities now open to them exceedingly weak or totally ineffective substitute sources of satisfaction The objective in recreation and art therapy programs is to help the patient find in diversional activities some of the satisfactions which he formerly derived from being the breadwinner or homemaker or from any other role that held significance for him prior to illness In the vocational rehabilitation project an attempt is made to provide the patients with one of the types of activity which were a potent source of satisfaction prior to illness and at the same time, remunerative A major objective in this experimental program is to determine whether or not the patients develop feelings of

usefulness and adequacy primarily from performing work for which they are paid

The second problem with which the Home Care occupational programs attempt to help the patients grows out of the first In having to give up the activities which made him feel useful prior to his illness the patient also, more often than not gave up activities which he had used as outlets for strong emotional reactions It is extremely important that the chronically ill person have such an outlet, his need to ventilate emotion may become more acute with illness when he has in addition to the emotional problems which beset any human being the fear, depression, and other strong feelings with which he reacts to illness

RECREATION AND ART THERAPY

Recreation and art therapy is provided the Home Care patient by two therapists Within a few weeks after he is admitted to Home Care a therapist visits him to try to find out how adequately he is occupying himself independently and to evaluate the need for services She wants to know, for example whether or not the patient has friends who visit him whether he reads listens to the radio watches TV and what sort of hobbies he may have She also looks into the patient s work history and interests prior to illness

Although a few patients are found at the evaluation visit to have no occupational problem and to be leading lives which are as well rounded as might be expected under the circumstances most are found to be a good deal less active than they need be These patients are visited by the therapist weekly or as often as is necessary to help them cultivate interests in stimulating and physically possible pursuits The activities initiated with the patients may be entirely in the field of art therapy entirely in recreation therapy or they may be a combination of both The character of the activity is determined by the patient s skills, aptitudes and interests and by the Home Care team s ideas regarding the role of productive activity in the patient s medical treatment

In recreation therapy the patient is encouraged to pursue any activity which promises to be personally satisfying to him The program is therefore a highly individualized and diversified one For example recreation therapy for one severely disabled arthritic patient consisted of learning to wield an outsized crochet hook so that she could make carriage covers for the numerous children of her friends and neighbors For a young

man with rheumatic heart disease it was learning to make with the help of his wife slip covers for their shabby living room, of which they were very much ashamed The service to one elderly gentleman consisted simply of paying cab fare once a week to the fire station to play pinochle with cronies

Ofttimes, recreation therapy is largely a matter of supplying equipment For example a 19 year-old boy with rheumatoid arthritis was supplied with accessories for his hobby ham radio operation The patients are encouraged to make use of any occupational resources in their homes and their radios TV sets and sewing machines are frequently repaired for them Special equipment such as work tables and bed or chair trays may have to be devised particularly for patients with arthritis As part of recreation therapy the patient is encouraged to participate in the planning of his equipment and to carry out any part of its construction that he can

For some patients recreation therapy may be intellectual rather than a physical activity Library books often in foreign languages and on special topics are provided and patients are given guidance in the selection of reading material A portable record player and records are rotated among patients The therapist sometimes spends her visit with a patient discussing with him the books he reads and the music to which he listens

Although the recreation program for the arthritic patient does not differ in principle from the program for other Home Care patients their physical limitations may be so restrictive as to require additional services The arthritic patient frequently needs special training and equipment to enable him to make maximum use of his residual physical capacities It is also desirable at times to include in his occupational program activities involving motions which may assist in increasing his ranges of movement

Art therapy emphasizes free creative expression in painting modeling weaving leather work and similar activities All people have some capacity for creative self expression and it is particularly important for the chronically sick person to develop this capacity so that he can discharge through creative activities emotional reactions generated by his illness The art therapist attempts to help each patient develop his capacity for creative activity to the maximum

In many persons the degree to which this capacity can be developed is extremely low In our highly mechanized society both work and leisure offer few opportunities for and little encouragement to creative behavior Typically a worker carries out part rather than all of a work process

and does not understand the relationship of his task to the completed product. Many people spend all their leisure time in listening to the radio, watching TV or movies, and in other passive activities. Having habitually suppressed creative urges, it is difficult for an individual to cultivate them in the face of illness. On the other hand, a period of illness may be the one period in a person's life when he will take the time to cultivate creative interests.

In undertaking to help the patient develop his creative ability, the art therapist encourages him to make increasing numbers of decisions regarding the way in which he is to carry out his art or craft projects. The level of creativity at which one may start and to which it may be possible to progress varies enormously with individual patients. Most patients who are able to incorporate even a few of their own ideas in their projects find them more satisfying than projects in which they are told exactly what to do and how to do it.

Painting is particularly popular among arthritic patients. This interest illustrates a point which has been found to be an important consideration in an occupational program for such patients. Painting is an activity which offers negligible physical benefits for the arthritic patient but which provides a potent source of satisfaction. In trying to help the arthritic patient develop a repertoire of appropriate interests, there is sometimes a tendency for the therapist to become too absorbed in therapy for mechanical problems posed by the patient's physical disability, forgetting that the activity itself must be a stimulating one for the patient.

About a year ago, some of the Home Care staff became concerned about the fact that with ample opportunity to develop a wide range of interests, some patients were failing to do so. Several checks of the Home Care census showed that on any given day, the recreation and art therapists were actively working with approximately two thirds of the 80 to 90 patients on Home Care. A few of the patients not being seen by the therapists were people who were independently able to occupy themselves adequately. A few were terminal patients for whom little or nothing could be accomplished by the program. The remainder had been dropped because they had been totally uninterested in the activities offered.

One of the Home Care physicians and the supervisor of recreation and art therapy undertook to determine the kinds of patients who were rejecting the program. They reviewed the recreation and art therapy notes on 300 Home Care patients with whom the therapists had worked or had attempted to work in the course of the preceding three-year period.

man with rheumatic heart disease it was learning to make, with the help of his wife slip covers for their shabby living room, of which they were very much ashamed The service to one elderly gentleman consisted *simply of paying cab fare once a week to the fire station to play pinochle* with cronies

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It seems probable that many of the Home Care patients who reject diversional activities do so because they see what is offered as play' and they disdain it as such To derive satisfaction from such leisure time pursuits, these patients would have to give up some of their needs to do things for a specific purpose and learn to do them just for the fun of it This involves a radical change in attitude and it is understandable that the change may be difficult if not impossible

While a Home Care recreation and art therapy program may not be successful with certain patients, it should be pointed out that it is highly satisfactory with nearly two thirds of them For those patients for whom the program does not prove appropriate, the Home Care staff continuously seeks solutions to the occupational problems It was this search for other occupational programs that led to the development of the vocational rehabilitation project

VOCATIONAL REHABILITATION

Jobs for the Homebound is a vocational rehabilitation research project currently being conducted by the Home Care Department of Montefiore Hospital in New York City The original impetus for the project came from Home Care patients who literally pleaded for real work to do

When the first requests were made the Home Care staff attempted to find suitable vocational rehabilitation services in the community for these patients It soon became apparent that there were none Existing programs dealt largely with persons who could be expected to return to competitive or sheltered workshop employment The one available vocational program for the homebound required a better prognosis than could be expected for the majority of Home Care patients where prognoses were acceptable, as in arthritis requirements for manual dexterity could usually not be met

This lack of appropriate community resources in vocational rehabilitation led to a formal study of the situation First the Home Care census was analyzed and it was found that one third of these very sick people wanted work This figure was considered significant, for although it pertained directly to only 80 to 90 chronically ill homebound people, there were thousands of similar patients throughout the city, a comparable proportion of whom also presumably wanted and lacked facilities for finding work

Secondly the study sought to find out what had been done vocationally

Patients were classified according to their degree of participation in the program as active semiactive, or inactive The groups were then analyzed in terms of sex age, and diagnosis It was found that more men than women were rejecting the program—about 70 per cent of the men in contrast to 20 per cent of the women Older patients participated in the program less frequently than the younger ones Nonparticipation was particularly prevalent among older men and the program rarely had been successful with men over fifty The least responsive patients were those who had arteriosclerotic heart disease most of whom were aged The most responsive were those with rheumatic heart disease and the next most responsive those with rheumatoid arthritis, both of these groups were relatively young The comparatively good response of the rheumatoid arthritic patients was interpreted as indication, in part at least, that the arthritic patient, with obvious physical deformity, often has a very real emotional investment in demonstrating his ability to carry out any motion expected of him He thus may be more willing to attempt a suggested activity because the physical motion involved is a challenge to him

The Home Care staff sought to analyze why certain types of patients responded better than others to the recreation and art therapy program It seems fairly obvious that one reason the program is more successful with women than with men is that women are accustomed to deriving satisfaction from home activities and can continue to pursue those which are sedentary when they are ill Men on the other hand characteristically derive satisfaction from work and other strenuous physical activities which cannot readily be continued at home Implicit in the recreation and art therapy program is the assumption that avocational activities can give the patient feelings of satisfaction similar to those which he derived from work and other pursuits which were emotionally significant to him prior to illness This assumption often may be a false premise Furthermore patients on Home Care are for the most part people who have always had to work very hard at earning a living or maintaining a home These were activities which had specific and positive purposes Satisfaction came not from the intrinsic process of the activity but from the fact that the activity accomplished a purpose In arts crafts hobbies and many of the activities offered patients in a recreation and art therapy program the character of the activity is such that satisfaction comes primarily from the process of carrying it out rather than from the fact that doing so accomplishes a purpose By cultural definition avocational activities are play Traditionally they are engaged in as an antidote to 'work and not as in the case of many patients as the individual s sole occupation

The 'Jobs for the Homebound' project also seeks to determine the cost of providing vocational rehabilitation services to Home Care patients and to evaluate whether the cost is justified by the therapeutic results

In the first two years of Jobs for the Homebound, 32 Home Care patients participated in the project

Two types of work activity were initiated One was industrial home work secured for patients by a vocational rehabilitation specialist The second was the development of individualized work plans by a design specialist This type was used with arthritics and other patients whose manual dexterity proved to be too impaired for them to perform the available industrial home work



FIGURE 133 Packaging of tags in cellophane bags by a homebound patient

The majority of patients (24) were able to do industrial home work and this type of work was found more readily obtainable than had been anticipated Most of the industrial jobs secured consisted of one- or two step operations and required at least moderate finger and hand dexterity Typical jobs included inserting gift tags in cellophane envelopes, lacing cord through advertising display cards and assembling novelty key chains Patients worked at the industrial jobs for from one to five hours a day the average being two hours Earnings ranged from $2 00 to $59 58 per month and averaged $14 21

The patients who proved unable to do industrial work were two arthritics, both women in their forties who had been sewing machine

with homebound persons in other parts of the country A survey of vocational rehabilitation programs for the homebound in the country as a whole revealed only eighteen such programs, almost all of which were geared to patients with greater productive capacities than the Home Care patients It was concluded, therefore that the vocational potential of the type of patient carried on Home Care had never been explored, and the decision was made to initiate a vocational rehabilitation project for those Home Care patients who wanted such service and through the project to carry out such an exploration

Jobs for the Homebound began as a pilot study which was operated from March 1 1955 to February 28, 1956 * On March 1, 1956 the study was expanded into a comprehensive five year demonstration project † With the latter project still in progress, information about the Home Care Department s experiences in vocational rehabilitation with its patients must at present be confined to a discussion of the long range objectives of the Jobs for the Homebound project and some findings of the most tentative kind

The primary objective of the project is to determine whether or not it is possible to locate home work for patients through established business and industrial channels and whether or not work can be devised for them There is real question as to the feasibility of attempting to secure work from business and industrial sources The limitations on the kind of work the homebound person can do are enormous The work for example (Figure 133) can involve only light portable materials since they may have to be carried up as many as five flights of stairs to the patient it also must be of a sort that need not be done in a hurry since the worker may be able to work for only a few hours a day and on some days may be too sick to work at all An economy minded business man is understandably reluctant to send work out under these circumstances

Secondly the project aims to determine as accurately as possible the effects of vocational rehabilitation services on patients both medically and psychologically these are being evaluated by objective testing as well as by clinical appraisal

* The Jobs for the Homebound pilot study was supported by a grant from the Nathan Hofheimer Foundation

† This investigation is supported in part by a Demonstration Special Project from the Office of Vocational Rehabilitation U S Department of Health Education and Welfare The project is also sponsored by the Nathan Hofheimer Foundation Inc New York State Chapter Arthritis and Rheumatism Foundation New York Heart Association Inc and Heart Fund and Montefiore Hospital

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The impact of work on the 8 patients who participated in the project actively for a year ranged from slight to very marked All appeared to derive some benefit from the experience It appeared that work affected the patients most often in the psychological area The most frequent and clear-cut psychological effect was reduction of depression as evidenced by restoration of a feeling of usefulness and productivity and by the patient s feeling that he was less of a burden on his family In the physical area, the primary effect of work appeared to be to change the patient s attitude toward illness The patients were generally less preoccupied with illness and adopted more realistic views of their physical capacities

In studying the effects of work it became apparent that the patient's reactions were often conditioned by his relationship to Home Care For many, the staff was the only significant human contact outside the family Patients used project personnel to meet their very great need for companionship It was suspected that a few patients worked primarily because, despite assurance to the contrary they feared losing Home Care if they did not do so

Project experience to date indicates that it is possible to provide vocational rehabilitation services to severely disabled homebound patients and that the majority improve when they work, particularly in their psychological conditions It will be increasingly important, as the project continues to find out whether the degree of improvement is sufficient to recommend that vocational rehabilitation services be extended generally to chronically ill, homebound patients

operators prior to illness (Three arthritics participated in the project, one was able to do industrial home work)

The first step in developing individualized work plans for these patients was to determine whether modifications of work methods or equipment would enable them to perform any of the available industrial home work It was found that the investment of time and money necessary to adapt the work was not justified because of the short-term nature of the contracts

The arthritic patients themselves preferred to resume work in the needle trades and despite severe involvement of hands and fingers, it was felt that they could handle simple machine sewing The source of appropriate work proved to be the Montefiore Hospital Linen Supply Room which manufactures syringe wrappers surgical glove covers, hemmed towels and other articles calling for straight machine stitching After establishing in a trial run that the arthritic patients could carry out the required processes the project contracted with Montefiore Hospital to produce limited quantities of these articles To date the two arthritics plus three other project patients have been steadily engaged on the sewing contract It was of interest that arthritic patients past experience in machine sewing enabled them almost instinctively to maneuver the fabric in the manner most comfortable for them adapting the standard work process to their individual limitations

The arthritic patients also served as guinea pigs in the designer's experimentation in the development of salable articles for manufacture by *patients with extensive limitations in manual dexterity* *First, an analysis* of the arthritic patients manual abilities was made by the designer and the patients Home Care physician Next local retail markets were surveyed On the basis of these preliminary studies and following experimentation with a variety of materials and processes block printed cocktail napkins and place mats were designed Production of these articles was tested successfully with patients and buyers at representative shops ascertained their probable marketability

The impact of work on patients is evaluated yearly To date 14 patients have been followed by the project for a year or longer Of these, 8 patients accepted work on all occasions when it was available and 6 consistently rejected work Four of the latter were patients who were admitted to the project because the staff thought they would benefit from work rather than because the patient asked for it The other two patients who refused work had requested admission to the project but subsequently did not feel well enough to work

limited, and attempting to use with some modification existing resources for vocational rehabilitation

It seemed most advisable to use an existing facility and to supply substantial additional assistance to that facility to enable it to expand its program to meet the needs of patients with rheumatic diseases This resulted in an agreement with the Institute for the Crippled and Disabled in New York under which a special program was created the aim of which was to concentrate on working with the vocational problems of patients with arthritis To give the program structure and freedom, and to coordinate its various aspects, a trained vocational rehabilitation counselor was put in charge of the entire operation

The basic premises of the program were the beliefs that people who were disabled could in large numbers be assisted to return to gainful employment that people with rheumatic diseases were no exception, and that re employment could be accomplished without injury to the arthritics and with benefit for the community as a whole

OBJECTIVES

As the program developed three main functions were recognized

(1) Education and information, both on a community and professional level (*a*) to stimulate rehabilitation orientation of arthritis patients, their families, and the professional workers with whom they come in contact (*b*) to stimulate early referrals to vocational rehabilitation sources and particularly the Back to Work program and (*c*) to assure continued close cooperation with resources already rendering services

(2) Direct service through working with arthritic patients in an attempt to assess and remedy the vocational difficulties arising out of the impact of the disease

(3) Research (*a*) to determine the nature and intensity of the problems of people with rheumatic diseases and the bearing of these problems on their status as potential gainful workers in the community (*b*) to assess these problems and determine the procedures and techniques needed to meet them most effectively and (*c*) to determine the kinds of problems resistant to effective solution in a vocational rehabilitation program

Educationally the Back to Work program aimed first to provide information about its facilities to arthritis clinics (some forty four in New York City) In addition all members of a clinic staff (physicians occupational therapists social workers physical therapists, and even clinic

25

Vocational Counseling and Job Placement

MARTIN ACKER

A Back to Work program for people suffering from rheumatic disease deals with people with physical and mechanical impairments who have concomitant emotional and psychological problems and who have lost or are redeveloping occupational skills Their acceptance of vocational rehabilitation services is a manifestation of desire to resume an independent and respected place in the society of men A 'Back to Work program measures its success by the extent to which its patients can resume gainful competitive employment, such employment being the major indication of their return to a productive place in society

ORGANIZATION OF A PROGRAM

In 1953 under the auspices of the New York Chapter of the Arthritis and Rheumatism Foundation a Back to Work program for arthritic persons was undertaken As a result of its close association with various hospital arthritis clinics and their medical and social work staffs the Foundation became aware that a very high proportion of patients seen at these clinics were experiencing great and sometimes overwhelming difficulties in returning to former employment or to employment at all Its information was amplified by an intensive study which it conducted in several representative hospital clinics Surveying the community in an attempt to find suitable resources for the alleviation of these employment problems the Foundation found that there was no vocational program designed to work with people with arthritis or in fact particularly concerned about the problem The choice therefore was between setting up a separate program which of necessity would have to be severely

limited and attempting to use with some modification existing resources for vocational rehabilitation

It seemed most advisable to use an existing facility and to supply substantial additional assistance to that facility to enable it to expand its program to meet the needs of patients with rheumatic diseases This resulted in an agreement with the Institute for the Crippled and Disabled in New York under which a special program was created, the aim of which was to concentrate on working with the vocational problems of patients with arthritis To give the program structure and freedom, and to coordinate its various aspects a trained vocational rehabilitation counselor was put in charge of the entire operation

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Educationally the Back to Work program aimed first to provide information about its facilities to arthritis clinics (some forty-four in New York City) In addition all members of a clinic staff (physicians occupational therapists social workers physical therapists and even clinic

registrars) were kept continuously aware of both the possibilities and the limitations of vocational rehabilitation so that the patients referred would be those most likely to use the services effectively The clinical staff was alerted to recognize early the existence or potential existence of vocational problems so that referrals might be made early, thus minimizing the detrimental effect of unsatisfactory employment or un employment

Through close contact with nonmedical agencies and various other media the community at large was kept informed about this special effort and its results At the outset of the program, community education consisted essentially in advising key areas in the community of the existence of special resources for patients with arthritis As the program progressed however, it became possible to point to the promising and positive results of the vocational rehabilitation work

PROBLEMS

Initially many physicians doubted the feasibility of sustained voca tional rehabilitation of people with arthritis One basis for this doubt was the feeling that impairment of the joints would so limit the patient s general mobility that placement in most cases would be exceptionally difficult if not impossible This raised the question whether such intensive effort as vocational training would be economically rewarding The second basis for the doubt was the unpredictable course of rheumatoid arthritis It was felt that while many patients in the state of remission might engage in a rehabilitation program including vocational training it was quite likely that exacerbations of the disease would necessitate discontinuance of rehabilitation efforts with a resultant waste of time money, and effort for the patients and the professional staff A third and perhaps the chief basis for doubting the wisdom of a vocational rehabilitation program was the emotional problems of people with rheumatic diseases and especially patients with rheumatoid arthritis Time and again the objection was voiced that in patients with rheumatic diseases, concomitant problems of a psychiatric nature were so prominent that their ability to use voca- tional rehabilitation was markedly restricted

Finally there was the problem of community education in general and the education of employers in particular Success in vocational rehabilita- tion can be measured only by the successful placement of clients The problems of employer resistance to the placement of patients with rheu matic diseases and the steps taken to effect suitable permanent place

ment will be treated in greater detail later, in the discussion of the results of this program

JOB PLACEMENT

In the first two and one half years of the study project, 215 patients with arthritis were referred by hospital clinics private physicians, social agencies or by themselves for vocational rehabilitation services in the Back to Work program The limitations set on the types of people to be referred were extremely broad Any rheumatic diagnosis was acceptable and physical status was not a limiting factor if the referring source or the Medical Department of the rehabilitation center believed that there was some potential for eventual competitive employment The ages of referrals ranged from 16 to 73

From the beginning of the program it was clear that the anticipated problems did exist People came with severe physical difficulties and with mechanical impairments They came fearful of the extent to which they could possibly improve physically anxious about the extent to which their vocational skills could be developed extremely concerned about the reception they would receive both in the program and from employers and fellow workers should they reach the level where placement might be considered possible A good number of patients approached the vocational rehabilitation process with hesitation anxiety and hostility In many instances within a brief period of time there developed a strong dependency upon the rehabilitation center and upon the individual workers handling the cases Many people having had unfortunate vocational experiences during the early stages of their disease came convinced that employers would not accept them or that if employers did accept them so many special adaptations or considerations would be necessary that continuous permanent placement would not be feasible

Problems *notwithstanding 40 per cent of the people referred to the* Back to Work program became and remained successfully employed with 98 per cent of the group finding employment in competitive industry An additional 30 per cent of the total group of referrals were continuing to receive service and the expectation was that between 80 and 90 per cent of these eventually would achieve successful vocational adjustment. Only 30 per cent of the 215 referrals were either unable to undertake the *program or after becoming involved in it* were unable to benefit from it This 30 per cent however may not be a reliable figure since many patients who were dropped from the program or

refused to accept its services returned at later dates when circumstances had changed sufficiently to motivate them to seek and use the service

It is estimated that a minimum of 60 per cent of people referred to such a rehabilitation service can successfully use it and be returned to competitive industry Only 2 per cent of the successful group were placed in sheltered work activities and among many of these, placement in sheltered workshops was viewed as a transition between the rehabilitation training and eventual placement in competitive industry While placements were effected in all age groups they were most successful among patients 30 to 40 years old Except for the adolescent groups still in school chronological age cannot be considered a definitive factor since chronological and vocational age are often not synonymous Although as many women as men were accepted for the program the placement rate for men was somewhat higher than that for women

In undertaking this vocational rehabilitation work with rheumatic patients many problems on different levels and of different degrees were anticipated These anticipations were valid in many areas The outcome, however indicated that in a very high proportion of cases successful vocational readjustment was possible Logically, then one might ask, Where is the contradiction? or What were the solutions? The answers lie in the types of services offered the manner in which they were applied, and most important in the manner in which they were integrated with the patient himself always being the focus

Patients came with medical and physical problems substantiated by detailed medical data from the referring source or from the Medical Department in the rehabilitation center These problems were approached therapeutically by the clinic or private physician in coordination with the team physician the occupational and physical therapists the vocational counselor the psychologist and the case worker Vocationally disability from rheumatic diseases often proved to be more apparent than real If activities of a vocational nature could not be accomplished in one manner attempts were made to accomplish them in another Where certain activities were impossible the patient s untapped resources and potential skills were explored and it seemed always possible to find some dormant capacities of vocational significance which could be developed Since development of these resources however often necessitated a change of habit and of orientation the work even on this level called for a coordinated effort and could not be accomplished through the medical services alone

Information from referring social workers and physicians substan

tiated often by psychologists, case workers, and psychiatrists associated with the Back to Work program give ample evidence of the existence of emotional problems While formal psychotherapy was not always available and indeed not always applicable when available psychological therapy was available and applied in all cases This, however, was a therapy applied more by the environment than by the therapist The patient finding himself in a situation where concrete help and encouragement were given him and where the goals set were understandable and realistic derived therapeutic benefit sufficient in a high percentage of cases to enable him to organize his resources and to use facilities for successful vocational readjustment Seeing others with similar or greater disability served also as a tremendous stimulant and therapy Thus, as with physical disability emotional disability was not cured but difficulties arising from it were controlled sufficiently to preclude their becoming insurmountable obstacles

The average period of time that each person remained in the vocational rehabilitation program was about six months The most recent follow up of the people placed in jobs at the end of their rehabilitation program showed that 75 per cent were still employed In all but a very few cases, they were still employed on the same job as at the termination of the rehabilitation process Several of the early patients in the program had thus continued more than two years in their original placement and had done extremely well in terms of employer satisfaction as indicated by salary increases Follow up however must continue over a much longer period of time before any final statements can be made

TYPES OF *EMPLOYMENT AND WORK PERFORMANCE*

It is often asked what jobs are best suited for arthritics There are no arthritic jobs and each patient must be considered individually (Figure 134) Certain broad areas of work of course are precluded for people with rheumatic diseases These include jobs on which the worker is subjected to rapid changes in atmospheric conditions as in going in and out of refrigerators or coolers extremely heavy physical labors such as platform loading or unloading or work in the construction trades and work which is primarily standing or which involves constant stair climbing or walking This leaves then work which is essentially sedentary and which does not require manipulation of heavy objects The highest percentage of placement has been in the clerical field This area however is an extremely broad one and includes work varying from simple check-

ing or filing to the use of complicated accounting procedures and computational machines

About one half of the successful patients were returned to work closely related to that which they had done before the other half were placed in jobs substantially different from previous experience The person with arthritis thus can be considered for many types of employment, depending upon capacity interest and community availability It is extremely unwise to harbor preconceived notions as to the type of work a patient will eventually perform until there has been adequate opportunity to explore skills interests, capabilities, and general job availability in the community



FIGURE 134 Job placement primarily depends upon utilization of remaining abilities The occupational scope though selective is great

As far as can be determined none of the patients who received service through the Back to Work program has been involved in an industrial accident In general their attendance rate compares extremely favorably with that of industry generally Several patients reported physical difficulty and discomfort at least during the first weeks or months of employment a number of these reported going to bed when they got home from work and remaining in bed until it was time to get up for work the following morning In every case however where this was reported no time was lost from work It may well be that these people were being carried by the initial impetus of the program and a much longer period of

follow up is necessary to determine whether such strong motivation will continue In a number of cases however, where former patients have been working for periods of two years or more it seems reasonable to conclude that motivation based initially on the beginning impetus will be maintained

ROLE OF THE PLACEMENT WORKER

A program of vocational rehabilitation can be tested by the extent to which the disabled people it has served can sustain competitive employment Such a program must equip its patients to enter the labor market via the front door They must be able to meet all of the demands of the working world starting with the organization of a job seeking campaign and successful participation in employment interviews as well as meeting the demands of the actual working situation When one considers however that the average length of unemployment of the patients on this Back to Work program was two years and that many had been unemployed from fifteen to twenty years the necessity of including help with placement is understandable For some the physical difficulties presented no substantial vocational problem once adequate training and counseling had been applied For many others the emotional problems could be brought under sufficient control so that they would offer no significant barrier to meeting the occupational and social demands of work Most people experience anxieties on applying for a new job regardless of whether or not physical disability is part of the situation When to this normal anxiety are added physical disability and long absence from the labor market plus a new and untried skill the degree of the placement anxiety becomes more understandable

A placement worker must understand the physical capacities and limitations of the person with whom he is working He must understand the level of skill and the application of the skill to the major job for which the client is trained and to subsidiary jobs which might be related to it He must also understand and be able to work with each individual s own orientation each individual s interests and the kinds and degrees of anxieties that are present in each case Since his function is selective placement the worker is not dealing merely with a constellation of vocational skills but rather with a person having capacities and problems for which he must find a suitable job in its broadest sense including the vocational physical and social aspects Further the selective placement worker must know the community sufficiently well to direct the disabled

ing or filing to the use of complicated accounting procedures and computational machines

About one half of the successful patients were returned to work closely related to that which they had done before, the other half were placed in jobs substantially different from previous experience The person with arthritis thus can be considered for many types of employment, depending upon capacity interest and community availability It is extremely unwise to harbor preconceived notions as to the type of work a patient will eventually perform until there has been adequate opportunity to explore skills interests capabilities, and general job availability in the community



FIGURE 134 Job placement primarily depends upon utilization of remaining abilities The occupational scope though selective is great

As far as can be determined none of the patients who received service through the Back to Work program has been involved in an industrial accident In general their attendance rate compares extremely favorably with that of industry generally Several patients reported physical difficulty and discomfort at least during the first weeks or months of employment a number of these reported going to bed when they got home from work and remaining in bed until it was time to get up for work the following morning In every case however where this was reported no time was lost from work It may well be that these people were being carried by the initial impetus of the prog am and a much longer period of

time This knowledge covers medical status, skills interests, previous experience, and many small and seemingly insignificant facts about the person It also includes an ability by the placement worker to assess quickly the type of firm the employer is representing its needs, its methods of operation and in some cases the kinds of minor adaptations that might make it possible for a disabled person to work successfully in it The selective placement worker s ammunition also includes knowledge of the recent studies made about absenteeism accident rates and production rates of disabled people who are employed in industry Thus his job consists not merely in slipping his worker into a slot or a niche but in assessing the many intangible factors related to the particular job and evaluating how his client might live with this occupation, not only from the mechanical and manipulative point of view but from the social point of view Wherever it is possible the worker observes the actual job and its surroundings for which he feels his client may be eligible The placement worker in thus approaching selective placement must restrict his efforts to one or two or a very small group of patients at any one time for while he may be considered a salesman it is not a matter of mass selling

worker towards a suitable job with the minimum expenditure of effort and anxiety Finally the placement worker must in many cases be a job applicant s surrogate and present himself for the job He thus, to all intents and purposes secures the job for the disabled worker While this superficially may appear to be a compromise of the principles of rehabilitation when all factors are considered it may assume logical proportions

In accomplishing his objectives, the selective placement worker maintains a close relationship with all services of the rehabilitation program the medical and ancillary services psychological and social work services and to a major extent the teachers in the vocational training programs in which his patients are participating The understanding and insights *derived from these relationships are identified through the face to face* counseling relationship with the patient An essential purpose of the counseling relationship is to enable the disabled person and the counselor to understand by anticipation the kinds of situations that may be encountered in the securing and the holding of a job Possible pitfalls are uncovered and reviewed In some cases, a person to person contact is not the most effective means of eliciting ideas information, and understanding To overcome this difficulty the selective placement worker may use group vocational guidance By bringing together a number of people whose situations, problems and prospects are similar satisfactory resolutions may either be reached more quickly than in individual sessions or be reached when individual sessions have proved of little or no value Through these individual and group sessions the selective placement *worker develops a clear concept of the needs of his patients and through* discussions with other staff members he can determine the kind and intensity of placement services needed by each patient

In securing jobs for patients unable to do this effectively for themselves the techniques are time horored techniques of selective placement workers The placement worker s search for employers who are willing to discuss the possibilities of hiring disabled people may range from newspaper job advertisements to chance conversations overheard in public conveyances He may use previous employers relatives friends plus any leads from interested individuals in the community or from other placement sources *Initial* contact with potential employers is not very difficult to obtain However there are many major stumbling blocks between an initial salutation and a final acceptance on the part of the *employer*

When resistance is met the worker dips into his arsenal which consists of extensive knowledge of the client with whom he is working at the

by the chapters through various types of fund drives such as house-to-house canvassing, telethons etc or through participation in local Community Chests or United Fund drives Thirty six per cent of the funds raised locally are remitted to the national office for the national program

The national medical program of the Foundation is controlled closely by a Medical and Scientific Committee of some twenty prominent clinicians and scientists Similarly on a local level the Medical Committee represents various branches of medicine and works closely with the local medical society

National Program

The Foundation feels that adequate integrated care of the arthritic can only come about as a result of increased knowledge of the disease and also increased awareness of the problem among professional workers be they physicians physical therapists nurses occupational therapists social workers or vocational counselors To this end great stress is placed at the national level on fellowship and professional educational projects The basic research fellowship program is designed primarily to train individuals to become leaders in the research and academic fields devoted to the study of rheumatic diseases This program is divided into three parts the predoctoral awards for pre Ph D s and a few pre-M D s the postdoctoral awards which are chiefly for M D s and Ph D s interested in pursuing studies in research eventually leading to academic appointments and the senior investigator awards which are given to relatively established investigators for periods of five years A total of approximately thirty fellowships yearly are awarded These are not limited to citizens of the United States and the training does not have to be received in the United States

In the field of professional education the Foundation underwrites the publication of the Rheumatism Review which is a review of the English and American literature prepared by a committee of the American Rheumatism Association It appears at intervals in the *Annals of Internal Medicine* Reprints of a Review usually run to approximately 500 pages Some 7000 copies of the Review are issued free to senior medical students throughout the United States other copies are sold at cost to interested physicians Similarly the Primer on the Rheumatic Diseases prepared by the American Rheumatism Association and published in the *Journal of the American Medical Association* is given to each third year medical student

A number of other pamphlets have been issued for professional

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Voluntary Health Agencies

R W LAMONT-HAVERS ROBERT H MANHEIMER,
WILLIAM S CLARK, *and* M C G ANDREWS

The Arthritis and Rheumatism Foundation in the United States and the Canadian Arthritis and Rheumatism Society in Canada are the chief voluntary health agencies primarily concerned in the attack on arthritis and the rheumatic diseases in these two countries Although these two organizations are quite distinct and separate their common aims and similar organizations make it possible to discuss them together The programs of both organizations can be conveniently divided into three parts

(1) Support of research
(2) Education on both a lay and a professional level
(3) Support of the establishment of adequate treatment facilities

THE ARTHRITIS AND RHEUMATISM FOUNDATION

The Arthritis and Rheumatism Foundation was founded in 1948 at the instigation of the physicians of the American Rheumatism Association and prominent lay leaders The basic organization consists of a national body concerned with the integration of effort of programs which can only be carried on at a national level such as research fellowships and with the development of new chapters in areas of the country in which there is no unified effort to help the arthritic

The basic unit is the chapter which may encompass a city a part of a state or several states depending upon geographic location and population density It is the chapter s duty to organize and carry out a local program based on the three aims of the Foundation namely treatment services, education and research

Another great function of the chapter is fund raising The only money available to the Foundation to carry out its work is that which is raised

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workers among them Manual for Arthritis Clinics, Home Care in Arthritis and Manual for Nurses, Physical Therapists and Medical Social Workers on Arthritis and Related Disorders '

Various pieces of lay literature have been produced These include a question and answer pamphlet to explain in lay language a number of matters raised in questions asked by lay people about the arthritic diseases and handbooks on rheumatoid arthritis, osteoarthritis, and gout which the physician can give to his patient to explain these diseases more adequately

The Foundation subsidizes an Arthritis Self Help Device Center at the Institute of Physical Medicine and Rehabilitation in New York The Center seeks to catalogue test and devise new self-help devices for handicapped arthritic patients The information it compiles is made available to the various Foundation chapters and to all rehabilitation centers occupational therapists and physical therapists throughout the country

Various types of special projects are undertaken from time to time These have included the production of teaching slides of the pathology of the rheumatic diseases sets of which were given free to each medical school in the United States Conferences are held, usually in conjunction with the American Rheumatism Association and the National Institute of Arthritis and Metabolic Diseases on such topics as teaching and research the serological reaction of rheumatoid arthritis and population studies of rheumatoid arthritis Transcripts of these conferences are published for the benefit of the workers in these fields

Chapter Programs

By and large the chapters are concerned with providing treatment and care for the arthritic patient The aim of this program is to make available for any physician adequate treatment facilities for any of his patients with arthritis or a rheumatic disease In carrying out this program the Foundation is not anxious to set up its own empire of treatment facilities Rather it attempts to utilize existing facilities within the community and by subsidization or other means to make them more efficient and better able to undertake the care of the arthritic patient When there is no organization within the community to take this responsibility the chapter will frequently set up a facility under its own sponsorship Some of the areas covered by this program include adequate care of the medically indigent patient through outpatient clinics diagnostic services home treatment programs consultation programs and integrated rehabilita

tion programs The home treatment program seeks to provide the services of a physical therapist and sometimes those of other professional workers such as an occupational therapist or a social worker In a number of cases it has been found to be more economical and a better utilization of community resources to subsidize the Visiting Nurse Association so that it can hire a physical therapist to undertake this program This physical therapist then advises the nurses on all homebound handicapped patients not just the arthritic In this way however the arthritic homebound person does get more adequate care In other instances the chapter supports a home treatment unit of its own using its own physical therapist and other workers

Similarly the rehabilitation program is usually accomplished through the subsidization of an existing rehabilitation unit or hospital facility so that the arthritic patient may be accommodated in these institutions Such subsidization takes the form either of paying the salary of one or more therapists or of paying so much for each patient treated

Of interest is the traveling consultant program whereby specialists or a group of specialists from a university or other center travel at regular intervals at the request of the local medical society to outlying small cities or towns and there see patients at the request of the physicians These patients would not be able to obtain the services of a consultant through other means

Some chapters subsidize hospital beds for the treatment of arthritic patients The local programs however usually have not attempted to undertake domiciliary care or other types of long term care for the arthritic patient

In the field of education the chapters do a great deal on a local level to keep the general public informed of the importance of the rheumatic diseases One of the most effective ways of doing this is through public forums at which a panel of physicians and other experts answer questions put from the audience as well as carry on a general discussion concerning the diseases Similarly articles and programs appear in the press and on radio and television on these subjects Professional education is encouraged through subsidization of postgraduate courses lectures and distribution of literature to physicians and other professional workers Some chapters have undertaken the fellowship training—of from three months to a year—of doctors who wish postgraduate work in the rheumatic diseases These physicians usually then return to their communities as specialists in the rheumatic diseases and thus form nuclei for renewed interest in them Similarly on a chapter level fellowships are given to

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On the national level the fellowship program of the Canadian Arthritis and Rheumatism Society is now very small In the beginning the need for specialists in the field of the arthritic diseases was urgent and many fellowships were given specifically to train physicians who would return as clinicians and teachers to their communities By and large this deficit has been met and there are arthritis specialists in all of the major cities of Canada The national society does sponsor a number of research programs but most of the Canadian research is supported through the National Research Council There is a close working relationship between the Canadian Rheumatism Association and the Canadian Arthritis and Rheumatism Society

THE NATIONAL FOUNDATION

The National Foundation prior to July 1958 was known as the National Foundation for Infantile Paralysis During 1959 it broadened its program in the voluntary health field to include two additional major health problems namely rheumatic disease with particular emphasis on rheumatoid arthritis of young people through 18 years of age and birth defects, with specific emphasis on the congenital malformations of

medical students so that they can devote their vacations to research projects in rheumatic diseases

In the field of research many chapters have been very helpful in providing funds so that local research projects can be started while adequate and more prolonged support is being sought

Relation to National Institute of Arthritis and Metabolic Diseases

One of the National Institutes of Health set up under the Department of Health Education and Welfare of the Federal Government is the *National Institute of Arthritis and Metabolic Diseases* Federal money is administered through this institute to provide extramural programs by which universities and medical schools can increase the facilities available for the teaching of arthritis and to support research projects and clinical fellowships This governmental agency and the Arthritis and Rheumatism Foundation work very closely together and in many instances members of the policy making boards of the two institutions are the same people Through this coordinated effort each organization seeks to do what it can accomplish most efficiently In this way the arthritic patient and the community are better served

Relation to the American Rheumatism Association

There is a very close working agreement between the American Rheumatism Association a professional scientific body of physicians interested in the rheumatic diseases and the Arthritis and Rheumatism Foundation, the voluntary health agency in this field The close cooperation between the three agencies the American Rheumatism Association the Arthritis and Rheumatism Foundation and the National Institute of Arthritis and Metabolic Diseases makes for an all round program

THE CANADIAN ARTHRITIS AND RHEUMATISM SOCIETY

In many respects the Canadian Arthritis and Rheumatism Society has the same organization and purposes as the Arthritis and Rheumatism Foundation It too was formed in 1948 through the efforts of physicians and lay people interested in these diseases Its basic unit is called a division which in area comprises a province There are eight divisions since Prince Edward Island and Newfoundland are not yet organized Each division is further divided into branches which are the local units in the smaller towns and cities within the province The national body depends upon the divisions for its funds the division being the primary fund raising body through its branches

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the central nervous system, particularly hydrocephalus, encephalocele and spina bifida While the Foundation's expanding program at present includes only these restricted areas of patient care, a broad program of research in these and related diseases is under way

Originally established in 1938 by the late President Franklin Delano Roosevelt the Foundation has continually supported an intensive program of medical care, professional education and research As a result of the intensive and extensive research program the polio vaccine was developed by Dr Jonas A Salk When complete vaccination coverage of the public is attained the Foundation will find itself in an increasingly effective position to expand its program into areas of greater medical need

Arthritis Research and Patient Care

With the announcement on July 22 1958 of its expanded program the Foundation indicated that it would pursue promising research leads uncovered in part through investigations on poliomyelitis and would initiate a broad new concept of attack on disease and disability Its name was therefore changed to The National Foundation' and the expansion of all its programs began Grants in aid of research on rheumatoid arthritis have already been made and more and more research projects in this field are being considered for support Studies on the nature of arthritis as a disease its pathology, its etiology and its treatment will undoubtedly continue to increase in number The Foundation has received numerous requests for financial assistance of investigations in these and closely allied areas

Paralleling its support of research now being carried on at leading universities and medical schools throughout the country the National Foundation continues to back a program of patient aid In the 3100 chapters of the Foundation located in every county in the United States maximum use will be made of its large corps of volunteer workers who will assist the patient with arthritis in obtaining required medical attention at suitable treatment establishments in the community Full use will be made of the existing facilities and financial help will be supplied when the patient s requirements are such that they cannot be met by existing agencies or community services No attempt will be made to duplicate the services offered by other agencies already operating in this field but every effort will be made to extend medical care and treatment facilities to patients who otherwise might be deprived of suitable care

Fncs to support this program as is true of all programs of the

National Foundation, is secured through the annual drive, the March of Dimes These monies, which have so successfully brought about the conquest of polio it is hoped will prove equally effective in overcoming the effects of rheumatoid arthritis as well as the impact of congenital malformations on the children of this country In developing the patient care program, it is anticipated that a great deal of assistance will be given the parents of these children in meeting their problems

In order to carry on properly the program of patient aid in the field of arthritis, it is necessary to provide for the further training and preparation of skilled professional workers, including physicians nurses physical therapists, occupational therapists medical social workers psychologists and vocational guidance counselors The National Foundation has therefore begun a program providing scholarships for the training of young people entering the fields of nursing physical therapy occupational therapy, and medical social work as well as the field of medicine This is largely motivated by a desire to maintain the supply of well trained people available for the care of individuals with rheumatoid arthritis and other diseases in much the same manner as was found necessary to insure the care of the poliomyelitis patient The Foundation also plans to establish short courses and training programs for the practicing physician, nurse, physical therapist and others to help them increase the effectiveness of their service

Several centers have been authorized for the purpose of offering specialized treatment services for patients with rheumatoid arthritis These as well as the centers to be established in the future, will provide not only excellent medical care but in addition the clinical resources for the training of professional personnel Operating in close working relationship with medical schools they afford physicians and others capable of carrying on competent clinical investigation an excellent working facility for study and further advancement of knowledge in the field of rheumatology

VOLUNTARY AGENCIES IN BRITAIN

The Empire Rheumatism Council

The objectives of the Empire Rheumatism Council in Britain are broadly similar to those of its sister organizations in the United States and Canada There is however one great difference due to the existence of the National Health Service, the organization does not undertake treatment or rehabilitation of any kind These are provided by the State,

but the Council does act as a 'watchdog' doing all that it can to ensure that adequate facilities are available throughout the country

The Empire Rheumatism Council was founded in 1936 by the late Lord Horder with the main object of increasing and coordinating basic medical research into the rheumatic diseases Because of the intervention of World War II and the establishment of the National Health Service, the Council has only been able to get into its stride within recent years Its funds are raised entirely from voluntary sources, unlike its sister organizations it has no 'chapters' or 'divisions' since it does not have to finance treatment or rehabilitation

The Council pursues its objectives mainly through research fellowships or grants for specific projects which have received the approval of its Scientific Committees In recent years these projects have more than doubled but the Council is still hampered by lack of funds although this situation has improved recently In addition the Council has established and maintains the only two university professorial chairs of rheumatology in the country—at London and Manchester Universities It has also established a mobile Field Survey Unit the first in the world, to undertake extensive surveys of the rheumatic diseases The unit consists of two fully equipped caravans which can easily be towed from place to place and are completely self contained These population and industrial studies are proving a very valuable extension to the research program of the Council

In the field of education the Council founded and still controls the *Annals of the Rheumatic Diseases* now published by the British Medical Association organizes postgraduate courses for consultants and others and issues a quarterly bulletin for general practitioners which is sent to some 25 000 doctors throughout the country In addition handbooks on rheumatoid arthritis and osteoarthritis are published for use by patients through their physicians and a card has recently been produced for patients on steroid therapy

The Heberden Society

The Council keeps a very close relationship with the Heberden Society which is a clinical and scientific body formed in 1936 for the advancement of the study of the rheumatic diseases

The British Rheumatic Association

Another organization in Britain concerned with the rheumatic diseases is the British Rheumatic Association This is a membership

organization which exists for the welfare of the rheumatic sufferer This is advanced by means of an advisory service and allocation of financial assistance for those in need In addition, the Association uses its services to campaign for increased facilities for diagnosis, treatment, and rehabilitation

Sources of Additional Information

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Manual for Nurses Physical Therapists and Medical Social Workers on Arthritis and Related Disorders Arthritis and Rheumatism Foundation New York State Chapter 432 Fourth Avenue New York New York

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Rehabilitation Monograph VI *Self Help Devices for the Arthritic* Edward

W Lowman Institute of Physical Medicine and Rehabilitation 400 East 34th Street New York 16 New York

Rehabilitation Monograph VIII *A Manual for Training the Disabled Homemaker* Howard A Rusk Edith L Kristeller Julia S Judson Gladys M Hunt Muriel E Zimmerman Institute of Physical Medicine and Rehabilitation 400 East 34th Street New York 16 New York

Rehabilitation Monograph X *A D L Activities of Daily Living Testing Training and Equipment* Edith Buchwald Lawton Institute of Physical Medicine and Rehabilitation 400 East 34th Street New York 16 New York

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The Effect of Arthritis on the Life Adjustment of a Group of Arthritis Clinic Patients Arthritis and Rheumatism Foundation New York State Chapter 432 Fourth Avenue New York New York

Materials Helpful for Patients *

A Handbook on Rheumatoid Arthritis General information for the patient on the disease its diagnosis and various forms of treatment Brief discussion of weather and climate diet spas and so called cures

Arthritis What arthritis is like what modern medicine can do what the arthritic patient can do

Device News Describes self help devices with prices and sources

Diet and Your Arthritis And other facts about arthritis

Home Care in Arthritis Describes and illustrates physical therapy exercises and self help devices for patients with rheumatoid arthritis and osteo arthritis

Osteoarthritis A handbook for patients The disease and its effects Treatment diet posture exercises heat drugs etc The role of the physical therapist

Questions about Arthritis and Rheumatism Answers to the 78 most commonly asked questions about the rheumatic diseases and their treatment

Self Help Devices for the Arthritic Illustrates describes and gives sources of equipment useful to patients handicapped by arthritis

* Are available free or at small cost from local Arthritis and Rheumatism Foundation chapters or from the Arthritis and Rheumatism Foundation 10 Columbus Circle New York 19 New York

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